Technical and Professional Education

Curriculum Content Frameworks for Industrial Apprenticeship/ Work-Based Learning

Curriculum Content Frameworks for
Industrial Apprenticeship/Work-Based Learning
Developed by the
Arkansas Department of Workforce Education

State of Arkansas
Department of Workforce Education

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NOTICE TO THE READER

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Preface

The Technical and Professional Education program continues to prepare students for employment and continuing education. To accomplish this preparation, teachers and employers have collaborated to modify individual programs to ensure that instruction is current and comprehensive. This document reflects essential competencies as well as many aspects of technology in industry as required by the Carl D. Perkins Act. The curriculum content frameworks for all Technical and Professional Education programs can be accessed through the Department of Workforce Education Web site, http://dwe.arkansas.gov/CurriculumFrameworks/indexframeworks.htm.

Foreword

The curriculum content framework *Industrial Apprenticeship/Work-Based Learning* supports the courses that prepare students for many career roles in technical and professional education programs of study. The courses may be sequenced with a variety of career and technical courses to form a specialization to prepare students for careers and support additional education and training in the various career families (career clusters). We have listed only a single role for each career area to serve as an example of the many career roles in each career area. Many other career roles are found within each family but were too numerous to list. A comprehensive crosswalk list may be found at the Career Cluster Crosswalk Web site, http://www.careerclusters.org/crosswalks.htm.

Career Family: **Architecture and Construction**

Career Area: Design/Pre-construction

Career Role CIP Code: 04.0201 Architecture and Related Services

O-NET: 17-1011.00 Architects

Career Area: Construction

Career Role CIP Code: 46.0201 Carpentry/Carpenter

O-NET: 47-2031.00 Carpenters

Career Area: Maintenance and Operations

Career Role CIP Code: 46.0412 Building Construction Site Management/ Managers

O-NET: 47-1011.01 First-Line Supervisors & Managers—Construction Trades Workers

Career Family: **Government and Public Administration**

Career Area: Governance

Career Role CIP Code: 44.0401 Public Administration

O-NET: 11-3011.00 Administrative Service Managers

Career Area: National Security

Career Role CIP Code: No Classification Listed

O-NET: 55-3013.00 Assault Vehicle Crew Members

Career Area: Foreign Service

Career Role CIP Code: 44.0401 Public Administration

O-NET: 11-1011.01 Government Service Executives

Career Area: Planning

Career Role CIP Code: 52.0601 Business Managerial Economics

O-NET: 19-3051.00 Urban and Regional Planners

Career Area: Revenue and Taxation

Career Role CIP Code: 52.0303 Auditors

O-NET: 13-2011.00 Accountants and Auditors

Career Area: Regulation

Career Role CIP Code: 46.0403 Building/Construction/Home Inspection/Inspector

O-NET: 47-4011.00 Construction and Building Inspectors

Career Area: Public/Nonprofit Management and Administration

Career Role CIP Code: 44.0401 Public Administration

O-NET: 11-1011.00 Government Service Executives

Career Family: **Health Sciences**

Career Area: Therapeutic Services

Career Role CIP Code: 56.1601 Nursing—Registered Nurse Training

O-NET: 29.1111.00 Registered Nurses

Career Area: Diagnostic Services

Career Role CIP Code: 51.1005 Clinical Laboratory Science/Medical Technologist

O-NET: 29-2011.00 Medical and Clinical Laboratory Technologists and Technicians

Career Area: Health Informatics

Career Role CIP Code: 51.0707 Health Information/Medical Records Technology/Technician

O-NET: 29-2011.00 Medical Records and Health Information Technicians

Career Area: Support Services

Career Role CIP Code: 03.0104 Environmental Science

O-NET: 19-4091.00 Environmental Science and Protection Technicians

Career Area: Biotechnology Research and Development

Career Role CIP Code: 41.0101 Biology Technician/Biological Laboratory Technician

O-NET: 19-4021.00 Biological Technicians

Career Family: **Law, Public Safety, and Security**

Career Area: Correction Services

Career Role CIP Code: 43.0102 Corrections

O-NET: 33-3012.00 Correctional Officers and Jailers

Career Area: Emergency and Fire Management Services

Career Role CIP Code: 43.0203 Fire Science/Firefighting

O-NET: 33-2011.00 Firefighters

Career Area: Security and Protective Services

Career Role CIP Code: 43.0109 Security and Loss Prevention Services

O-NET: 33-9031.00 Security guards

Career Area: Law Enforcement Services

Career Role CIP Code: 43.0107.00 Criminal Justice/Police Science

O-NET: 33-30XX.00 Police Patrol Officers/Police Administration

Career Area: Legal Services

Career Role CIP Code: 22.0302 Legal Assistant/Paralegal

O-NET: 23-2011.00 Paralegals and Legal Assistants

Career Family: **Manufacturing**

Career Area: Precision Metal Production

Career Role CIP Code: 48.0508 Welding Technology/Welders

O-NET: 51-4121.01 Production Welders

Career Role CIP Code: 48.0501 Machine Tool Technology, Technologist

O-NET: 51-4041.00 Machinist

Career Area: Production Design, Operations and Maintenance

Career Role CIP Code: 14.1901 Mechanical Engineering

O-NET: 17-2141.00 Industrial/Mechanical Engineers

Career Area: Electromechanical Installation and Maintenance

Career Role CIP Code: 15.0403 Electromechanical Engineering Technology

O-NET: 51-2023.00 Electromechanical Equipment Assemblers

Career Area: Precision Technology Processes

Career Role CIP Code: 48.0703 Cabinetmaking and Millwork

O-NET: 51-7031.00 Model makers, Wood

Career Family: **Transportation, Distribution, and Logistics**

Career Area: Transportation Operations

Career Role CIP Code: 49.0205 Truck and Bus Driver, Commercial Vehicle Operation

O-NET: 53-3032.02 Truck Drivers

Career Area: Logistics, Planning, and Management Services

Career Role CIP Code: 52.0203 Logistics and Materials Management

O-NET: 13-1081.00 Logisticians

Career Area: Warehousing/Distribution Center Operations

Career Role CIP Code: 52.0410 Traffic, Customs, and Transportation Clerk/Technician

O-NET: 43-5071.00 Shipping, Receiving Clerks

Career Area: Facility and Mobile Equipment Maintenance

Career Role CIP Code: 47.0604 Automobile/Automotive Mechanics/Technology

O-NET: 49-3023.00 Automotive Service Technicians

Career Area: Transportation Systems/Infrastructure Planning, Management, Regulation

Career Role CIP Code: 15.1102 Surveying Technology/Technicians

O-NET: 17-3031.00 Surveying and Mapping Technicians

Career Area: Health, Safety, and Environmental

Career Role CIP Code: 15.0507 Environmental Engineering Technology

O-NET: 17-3025.00 Environmental Engineering Technicians

Career Area: Sales and Service

Career Role CIP Code: 52.1804 Selling Skills and Sales Operations

O-NET: 41.4010.00 Sales Representative, Wholesale and Manufacturing

Career Family: **Science, Technology, Engineering, and Mathematics**

Career Area: Engineering and Technology

Career Role CIP Code 15.1306 Mechanical Drafting and Mechanical Drafting CAD

O-NET: 17-3013.00 Mechanical Drafters

Career Area: Professional Engineering

Career Role CIP Code: 14.1901 Mechanical Engineering

O-NET: 17-2141.00 Mechanical Engineers

Career Area: Science and Mathematics

Career Role CIP Code: 23.1101 Technical and Business Writers

O-NET: 27-3042.00 Technical Writers

Acknowledgments

The Industrial Apprenticeship/Work-Based Learning curriculum content framework was produced by a team of developers from the University of Arkansas at Little Rock and representatives from industry and education. A panel of experts in the field of cooperative education reviewed the information included in the framework. The format and content of the framework reflect the specific training needs within the state of Arkansas. The framework content and format are modeled after a document originally developed by a writing team under the auspices of the Virginia Department of Education. Grateful appreciation is expressed to the Virginia Department of Education for granting the Arkansas Department of Workforce Education access to its instructional frameworks.

Table of Contents

Introduction

About the Program

Industrial Apprenticeship/Work-Based Learning (IA/WBL) prepares students for entry into careers utilizing a cooperative effort with industry. IA/WBL alternates in-school instruction and supervised on-the-job training activities in technical and professional occupations. The student's total educational experience is planned in cooperation with the employer.

About the Document

- Section 1 contains a master duty/task list for the IA/WBL courses.
- Section 2 contains an analysis of each task, consisting of the task, task definition, and process/skill questions to evaluate acceptable performance. All tasks have been designated essential. Essential tasks are those that must be achieved by every student pursuing the completion of the IA/WBL courses.
- Section 3 lists the Arkansas Standards of Learning for language arts, mathematics, and science that are reinforced by instruction in the IA/WBL courses. Academic skills in these areas are necessary for the mastery of a number of tasks performed by professional and technical workers on the job.

Program Description

494030 Industrial Apprenticeship/Work-Based Learning I
494040 Industrial Apprenticeship/Work-Based Learning II

Industrial Apprenticeship/Work-Based Learning focuses on the duties and tasks performed by professionals in technical and professional careers while incorporating national standards in math, science, and technology. IA/WBL I will provide the student with an introduction to the work environment and what is expected of an employee. IA/WBL II will provide instruction on economic systems, employee/employer relations, and the importance of industry to our nation.

Master Duty/Tasks Listing

Industrial Apprenticeship/Work-Based Learning I
Industrial Apprenticeship/Work-Based Learning II

National and state experts in technical and professional careers have validated the duties and tasks in this section. Each is analyzed by identifying the following:

- a *duty*/*task statement*, which describes what the student is to do.

Industrial Apprenticeship/Work-Based Learning I
DUTY A: **Orientation to Industrial Apprenticeship/Work-Based Learning (IA/WBL)**
Task:
A 010: Introduction to Industrial Apprenticeship/Work-Based Learning (IA/WBL)
A 020: Rules and regulations for IA/WBL
A 030: Introduction to parliamentary procedures
DUTY B: **Industrial Occupational Management**
Task:
B 010: Employee relations
B 020: Job application skills
B 030: Resume and letter of application
B 040: Job interview skills
B 050: Understanding the paycheck
B 060: Money management and credit
DUTY C: **Industrial Safety**
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C 020: Personal safety

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L 030: Human resources
L 040: Natural resources
L 050: Capital resources
DUTY M: **Effects of Industry on the Economy**
Task:
M 010: Productivity
M 020: Profit margin

M 030: Obtaining capital
M 040: Research and development
M 050: Identifying consumer demands
M 060: Government controls and regulations
DUTY N: **Characteristics of Industry**
Task:
N 010: Types of industries
N 020: Importance of location
N 030: Employment opportunities
DUTY O: **Industries of the Future**
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O 010: Robots in industry
O 020: Automation in industry
O 030: Disappearing and emerging jobs
O 040: High-technology training
DUTY P: **Industrial Advertising**
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P 010: Types of advertising media
P 020: Cost versus outcome in advertising
DUTY Q: **Industrial Marketing and Distribution**
Task:
Q 010: Marketing research
Q 020: Transportation in industry
Q 030: Consumer satisfaction

Q 040: Packaging strategies
Q 050: Industrial sales and service
DUTY R: **Industrial Competition**
Task:
R 010: Competition among consumers
R 020: Competition among nations
DUTY S: **Industrial Personnel Technology**
Task:
S 010: Management in industry
S 020: Mid-level management
S 030: First-line supervisor
S 040: Labor and labor organizations
S 050: Industrial decision making
S 060: Intra-company mobility
S 070: Employer-employee relationships
DUTY T: **Outlook for the Future**
Task:
T 010: Personal occupational decisions
T 020: Establishing future goals

Task Definitions

Industrial Apprenticeship/Work-Based Learning I
Industrial Apprenticeship/Work-Based Learning II

National and state experts in technical and professional occupational fields have validated tasks in this section. Each task is analyzed by identifying the following:

- a *task definition* (criteria for acceptable performance), which explains what the student has to do to perform the task at the expected level of mastery; and
- *process/skill questions*, which assess student knowledge and performance.

Industrial Apprenticeship/Work-Based Learning I
DUTY A: **Orientation to Industrial Apprenticeship/Work-Based Learning (IA/WBL)**
Task:
A 010: Introduction to Industrial Apprenticeship/Work-Based Learning *Definition:* Process should include the following: • define terms related to cooperative education • identify and prioritize the goals and objectives of the IA/WBL program • distinguish the difference between the IA/WBL program and other cooperative programs in Arkansas Process/Skill Questions
A 020: Rules and regulations for IA/WBL *Definition:* Process should include the following: • define terms related to guidelines for IA/WBL • list rules and guidelines concerning employment through the IA/WBL program • list responsibilities for students enrolled in the IA/WBL program • establish a training plan for your training site • list the employer responsibilities for a training site • list responsibilities of the IA/WBL coordinator • list the benefits provided by the IA/WBL program to the community, student, employer, and school • identify the importance of good work habits and positive characteristics for an employee • distinguish between proper and improper characteristics and behavior for workers Process/Skill Questions

A 030: Introduction to parliamentary procedures

Definition: Process should include the following:

- define terms related to parliamentary procedures
- list principles on which parliamentary procedures are based
- list the various types of motions
- identify characteristics for various motions and their use in conducting a meeting
- explain the reason for an "Order of Business"
- identify the responsibilities of a chairperson
- demonstrate the ability to use parliamentary procedure

Process/Skill Questions

DUTY B:
Industrial Occupational Management

Task:

B 010: Employee relations

Definition: Process should include the following:

- define terms related to employee relations
- list causes of employer-employee conflicts
- list benefits of practicing good human relations on the job
- explain the major reasons why fired workers lost their jobs
- identify problems created by workers lacking a good work ethic
- develop possible solutions to eliminate problems caused by workers
- explain ways in which employees can assist management

Process/Skill Questions

B 020: Job application skills

Definition: Process should include the following:

- define terms related to job applications
- list the types of information asked on a typical job application
- describe guidelines to follow when filling out a job application
- list types of career leads available for seeking employment
- describe steps to take in finding a job or career
- complete an application for employment
- identify types of pre-employment tests
- describe factors that give a job application "sales appeal"

Process/Skill Questions

B 030: Resume and letter of application

Definition: Process should include the following:

- define terms related to writing a letter of application
- list points that should appear in the body of a letter of application
- describe methods to identify the person to whom a letter of application is sent
- define terms associated with writing a resume
- describe items that should appear on a resume
- describe acceptable methods for organizing a resume
- organize and compose a personal resume

Process/Skill Questions

B 040: Job interview skills

Definition: Process should include the following:

- define terms related to job interviews
- describe considerations when preparing for a job interview
- identify questions perspective employees may ask an employer
- identify questions an employer may ask prospective employees
- identify attitudes and positive impressions employers look for during an interview
- complete a self-analysis of personal habits and characteristics
- review typical procedures for a job interview
- describe good grooming habits for an interview
- ask and respond to questions during an employee interview
- identify appropriate methods for closing and follow-up for a job interview
- compose a follow-up letter for a job interview
- describe reasons that individuals are not selected for employment

Process/Skill Questions

B 050: Understanding the paycheck

Definition: Process should include the following:

- distinguish between information on IRS W-4 and W-2 forms
- describe differences between state and federal income taxes
- explain the difference between gross pay and net pay
- calculate gross pay and net pay for a typical pay period
- identify benefits an employer may offer through a payroll deduction plan
- explain how to fill out a payroll deduction chart
- complete a payroll deduction chart listing typical family deductions

Process/Skill Questions

B 060: Money management and credit

Definition: Process should include the following:

- define terms related to money management and credit
- describe various aspects of money and credit management
- describe advantages of checking and savings accounts
- describe the steps in filling out a check and deposit slip
- describe the process of reconciling a bank account
- process checks and deposit slips for a bank account

Process/Skill Questions

DUTY C:
Industrial Safety

Task:

C 010: Cost of accidents

Definition: Process should include the following:

- define terms related to health and safety in the workplace
- discuss direct and indirect cost of accidents in the workplace
- identify common causes of accidents in the workplace
- describe how workplace accidents reduce efficiency and erode morale
- describe the effects of accidents on public relations for a business

Process/Skill Questions

C 020: Personal safety

Definition: Process should include the following:

- describe basic workplace rules for personal safety
- write statements describing typical health guidelines
- list procedures for first aid in case of an accident
- describe clothing and apparel to avoid wearing in the workplace
- list hazardous occupations as classified by the U.S. Department of Labor
- describe the purpose of Occupational Safety and Health Administration (OSHA)
- describe responsibilities of employers to enforce OSHA guidelines in the workplace

Process/Skill Questions

DUTY D:
Introduction to Industry

Task:

D 010: Elements of industry

Definition: Process should include the following:

- define terms related to manufacturing, technology, and industry
- describe how "manufacturing" was done by early man
- trace the history and advancement of technology in your occupational area
- describe inventions that improved technology during the Industrial Revolution
- classify major types of industries
- explain the meaning of the "5 M's" as they relate to industry—manpower, machines, materials, money, and methods
- describe the relationship that exists between management and subordinates
- discuss ways people get ideas for new products and services

Process/Skill Questions

D 020: Industry and the economic system

Definition: Process should include the following:

- define terms related to industry and the economic system
- describe how industrial development takes place in a free enterprise system
- explain how the free enterprise system affects the work of the employer
- describe the relationship in supply and demand in industrial production
- describe how industry operates in a capitalist, socialist, and communist society
- write a short essay that describes the United States' economic system

Process/Skill Questions

DUTY E:
Components of Industry

Task:

E 010: Research and development

Definition: Process should include the following:

- define terms related to research and development
- describe the purpose of industrial research and development
- describe research methods used by industry to obtain information
- identify major industries and the products they produce
- explain reasons why product development would be difficult without research
- explain reasons why companies can spend large sums of money on research and development

Process/Skill Questions

E 020: Product design

Definition: Process should include the following:

- define terms related to product design
- describe how designers find ideas for new products
- identify limitations that control a company's production or output
- explain reasons why a company is careful about choosing a product to produce
- explain how brainstorming is used in the development of a new product
- describe how consumer demand is related to product design

Process/Skill Questions

E 030: Production

Definition: Process should include the following:

- define terms related to manufacturing and production
- complete a chart outlining the steps in the production of a product
- explain why packaging is a part of the production process
- describe the importance of having a quality control system before starting production

Process/Skill Questions

E 040: Quality control

Definition: Process should include the following:

- define terms related to quality control
- describe how the quality of a product is determined
- describe how specifications relate to quality
- describe the relationship between quality control and productivity
- discuss quality control as it relates to materials and manpower
- identify quality control methods used at your work site
- demonstrate uses of quality control
- describe statistical process control

Process/Skill Questions

E 050: Distributing the product

Definition: Process should include the following:

- define terms related to the distribution of products
- identify methods of transporting products to the consumer
- identify various types of distribution for products used by your occupation
- describe why warehousing is used as part of the distribution process
- identify various types of warehousing for products

Process/Skill Questions

DUTY F:
Taxes

Task:

F 010: Federal taxes

Definition: Process should include the following:

- define terms related to federal taxes
- describe federal deductions that relate to a paycheck
- fill out an employee's withholding exemption form (W-4)
- describe the guidelines for who should file a federal income tax return
- identify benefits received by a taxpayer from the tax dollars collected by the federal government
- state the guidelines for various forms that must be filed with a federal income tax return
- explain the process for filling out a federal income tax return
- complete a federal income tax return

Process/Skill Questions

F 020: State taxes

Definition: Process should include the following:

- define terms related to state taxes
- describe state deductions that relate to a paycheck
- describe the guidelines for who should file a state income tax return
- identify benefits received by a taxpayer from the tax dollars collected by the state government
- state the guidelines for various forms that must be filed with a state income tax return
- explain the process for filling out a state income tax return
- complete a state income tax return

Process/Skill Questions

DUTY G:
Job-Keeping Skills

Task:

G 010: Work ethic

Definition: Process should include the following:

- define terms that relate to employee relations
- distinguish between desirable and undesirable characteristics for getting along with co-workers
- compose guidelines to follow in getting along with co-workers
- identify steps to improving personal attitude
- describe typical excuses that workers give for work not completed satisfactorily
- describe the difference between work attitudes and work habits
- identify your work attitudes for your current job
- explain the process and develop a plan for self-improvement

Process/Skill Questions

G 020: Positive motivation

Definition: Process should include the following:

- define terms related to positive motivation
- identify characteristics of positive and negative attitudes
- evaluate personal attitudes and characteristics related to your workplace
- list typical employer expectations of employees
- discuss the sources of employer and employee attitudes
- describe reasons why attitude is such an important factor in job success
- identify and evaluate your positive and negative attitudes about your training site

Process/Skill Questions

G 030: Continuing education

Definition: Process should include the following:

- define terms related to continuing education
- identify industrial occupation categories in which jobs have increased in recent years
- identify pathways to advancement related to your occupation
- describe the purposes of career and technical education programs in high schools
- describe how job interests relate to various occupations
- describe how change has both positive and negative effects on workers
- describe the advantages of adult and continuing education
- describe the differences between apprenticeship and inservice training
- describe continuing education opportunities for your occupation

Process/Skill Questions

DUTY H:
Industrial Packaging Concepts

Task:

H 010: Planning for product packaging

Definition: Process should include the following:

- explain the purposes for product packaging
- describe the preparation process for producing a package
- explain characteristics of various packaging techniques
- identify innovative product packaging techniques

Process/Skill Questions

DUTY I:
Structure of Industry

Task:

I 010: Establishing a company

Definition: Process should include the following:

- define terms related to establishing a company
- describe the procedure for establishing the 5 M's for a company—manpower, machines, materials, money, and methods)
- describe how financing can be obtained for establishing a new company
- describe the importance of management and personnel for establishing a new company
- Outline the procedures for establishing a new company

Process/Skill Questions

I 020: Management

Definition: Process should include the following:

- define terms related to management
- identify the functions of management
- identify the personal qualities needed to be successful in a managerial/supervisory capacity with a company
- describe examples of ethical behavior exhibited by supervisors
- contrast the advantages of being a production worker versus being a manager
- describe the difference between job creators and job processors

Process/Skill Questions

I 030: Labor

Definition: Process should include the following:

- define terms related to labor
- discuss reasons for the creation of labor unions during the early days of manufacturing
- describe advantages and disadvantages of labor union membership
- describe common elements included in a labor union contract
- describe reasons that labor laws have been enacted

Process/Skill Questions

DUTY J:
Industry of the Future

Task:

J 010: Future trends in industry

Definition: Process should include the following:

- define terms related to future industrial trends
- identify factors that affect industrial trends
- identify regulations that affect jobs
- identify factors that influence industrial jobs
- describe how developments in technology are expected to improve both heavy and light industry
- describe how economic conditions may affect certain jobs in the future

Process/Skill Questions

J 020: Types of ownership

Definition: Process should include the following:

- define terms related to industrial organizations
- classify industrial organizations based upon ownership
- describe the major functions of a board of directors
- describe a "line-and-staff" organizational chart
- develop line-and-staff organizational charts for your training site
- classify industries according to their type of activity
- explain the chain of command of an industrial organization
- describe advantages and disadvantages of various types of industrial organizations

Process/Skill Questions

Industrial Apprenticeship/Work-Based Learning II
DUTY K: **Safety on the Job**
Task:
K 010: Employee safety *Definition:* Process should include the following: • define terms related to employee safety • describe attitudes toward safety necessary to be a successful worker • identify safety devices used in industry to protect the body • describe general safety rules for an industrial setting • list specific safety rules for your training site • discuss reasons a safe worker is valuable to industry • identify and describe ways to eliminate fire safety hazards • describe general hazards that cause bodily injury • describe ways to eliminate safety hazards that cause bodily injury • distinguish between providing emergency aid and practicing medicine • explain the Good Samaritan Law • explain the Occupational Safety and Health Administration (OSHA) safety monitoring process Process/Skill Questions
K 020: Tool, equipment, and material safety *Definition:* Process should include the following: • define terms related to safe use of tools, equipment, and materials • describe the importance of selecting the right tools for the job • describe the importance of safety features and devices on machines, and equipment • identify safe procedures for handling tools, equipment, materials, and machinery utilized at your training site Process/Skill Questions
DUTY L: **Effects of the Economy on Industry**
Task:

L 010: Law of Supply and Demand

Definition: Process should include the following:

- define terms related to the Law of Supply and Demand
- identify factors that affect supply and demand
- explain the Law of Supply and Demand
- describe how the Law of Supply and Demand affects the industrial job market
- discuss how one manufacturing process/product relies on another

Process/Skill Questions

L 020: Foreign competition

Definition: Process should include the following:

- define terms related to foreign competition
- describe what is meant by the term *low overhead*
- describe the importance of quality control
- describe ways that foreign industries are able to produce at a lower cost than U.S. industries
- compare U.S. production with foreign production
- describe how design and function of materials affect the marketing of foreign products

Process/Skill Questions

L 030: Human resources

Definition: Process should include the following:

- define terms related to human resources
- describe the importance of training for employment
- identify reasons a worker may need to be retrained
- discuss how the availability of trained workers affects industry
- compare the effect on industry of large and small labor pools
- analyze a poll of businesses about their human resource needs
- explain how on-the-job training relates to the economy

Process/Skill Questions

L 040: Natural resources

Definition: Process should include the following:

- define terms related to natural resources
- identify factors involved in site selection for extraction of raw materials
- identify products and natural resources
- describe how availability of manpower, utilities, and local production cost are factors for extracting raw materials
- describe how climatic conditions affect the use of natural resources

Process/Skill Questions

L 050: Capital resources

Definition: Process should include the following:

- define terms related to capital resources
- identify sources of capital for an industry
- describe methods of securing and acquiring capital for industry
- describe reasons government may assist in financing an industry
- discuss how projection and actual financing affect industry
- describe how availability of capital affects industry

Process/Skill Questions

DUTY M:
Effects of Industry on the Economy

Task:

M 010: Productivity

Definition: Process should include the following:

- define terms related to productivity
- identify methods used to increase productivity
- identify ways to maintain quality
- identify challenges related to quality control for increasing productivity
- describe the effects of productivity on an industry
- compare the relationship of management in foreign productivity with management's relationship in U.S. productivity

Process/Skill Questions

M 020: Profit margin

Definition: Process should include the following:

- define terms related to profit margin
- identify factors involved in making a profit
- distinguish between desired profit and actual profit
- describe how the overall economy affects profit margin
- discuss how profit is involved in price fixing and overpricing
- complete an "Effects of Profit" table

Process/Skill Questions

M 030: Obtaining capital

Definition: Process should include the following:

- define terms related to capital
- identify types of financing for a loan
- describe the where, when, why, and how of the commercial loan process
- discuss the benefits and challenges of applying for a loan
- write the process for obtaining capital
- explain how the stock market affects available capital

Process/Skill Questions

M 040: Research and development

Definition: Process should include the following:

- define terms related to research and development
- describe components of research and development
- explain reasons for the importance of research and development to both industry and consumers
- describe ways new information can increase profits through research
- identify local companies where research and development has increased profits

Process/Skill Questions

M 050: Identifying consumer demands

Definition: Process should include the following:

- define terms related to consumer demands on industry
- identify the limitations of industry in regard to consumer demands
- explain reasons that companies need to test for consumer acceptance of a product
- describe the process a company will follow to determine that a new product will be manufactured
- explain the effect that advertising can have on consumer demand for new products
- explain how consumer research is used in product design

Process/Skill Questions

M 060: Government controls and regulations

Definition: Process should include the following:

- define terms related to government controls and regulations on industry
- identify government agencies that control or regulate industry and manufacturing
- explain how OSHA policies affect safety in industry
- explain the effects that antitrust laws have on industry and manufacturing
- describe how the Environmental Protection Agency (EPA) affects industry and manufacturing
- describe the types of taxes paid by industry and manufacturing firms
- distinguish between *interstate* and *intrastate* commerce
- describe the effects of Interstate Commerce Commission regulations on interstate and intrastate commerce

Process/Skill Questions

DUTY N:
Characteristics of Industry

Task:

N 010: Types of industries

Definition: Process should include the following:

- define terms related to types of industries and manufacturing
- identify types of industries and types of manufacturers
- describe the products of various industries and manufacturers
- describe how byproducts of one industry can create another industry
- describe the types of industry in your community
- determine the type of jobs that are needed with a particular type of industry

Process/Skill Questions

N 020: Importance of location

Definition: Process should include the following:

- define terms related to the selection of a location for an industry
- identify different modes of transportation of raw materials
- identify factors related to location of an industry
- explain the importance of an available labor force in locating an industry
- describe the importance for the location of industry in relation to raw materials
- explain the importance of climate as a factor in locating an industry

Process/Skill Questions

N 030: Employment opportunities

Definition: Process should include the following:

- define terms related to employment opportunities in an industry
- identify various job classifications within labor and management
- distinguish between labor and management responsibilities
- explain the functions of different sections of a typical industry
- identify management personnel and the chain of command at your training site

Process/Skill Questions

DUTY O:
Industries of the Future

Task:

O 010: Robots in industry

Definition: Process should include the following:

- define terms related to robots and robotics in industry
- identify possible uses for robots in industry and manufacturing
- explain how robotics are used for production in different industries
- explain how a robot is able to perform a typical task
- describe how a robot is used to perform assembly work
- describe how robots affect production
- describe the future of robots in industry and manufacturing

Process/Skill Questions

O 020: Automation in industry

Definition: Process should include the following:

- define terms related to automation in industry
- identify ways that automation affects industry and manufacturing
- describe how automation can be used in different phases of an industry
- describe recent advances in automation

Process/Skill Questions

O 030: Disappearing and emerging jobs

Definition: Process should include the following:

- define terms related to disappearing and emerging jobs
- identify disappearing and emerging jobs
- explain the role technology has played in creating jobs in certain types of industry
- explain ways that industry copes with disappearing and emerging jobs
- identify jobs that may disappear or emerge in the occupation for which you are training
- classify occupations that may disappear, stay the same, or emerge

Process/Skill Questions

O 040: High technology training

Definition: Process should include the following:

- identify terms related to high technology and high technology training
- identify major areas of development in high technology
- identify occupations classified as high technology occupations
- describe the importance of high technology training to the economy and the nation
- explain ways workers are prepared for employment in high technology jobs

Process/Skill Questions

DUTY P:
Industrial Advertising

Task:

P 010: Types of advertising media

Definition: Process should include the following:

- define terms related to media used in industrial advertising
- explain how various types of media are used for advertising in industry
- describe the "tricks of the trade" used in industrial advertising
- describe the current importance of the various media to industrial advertising
- identify the types of media used by the company for which you are working

Process/Skill Questions

P 020: Cost versus outcome in advertising

Definition: Process should include the following:

- define terms related to the cost and outcome of advertising
- explain costs that are involved in advertising
- describe how decisions are made regarding advertising by manufacturing firms
- describe how an expected increase in profit is related to the money spent for advertising
- describe what results can come from both good and bad advertising

Process/Skill Questions

DUTY Q:
Industrial Marketing and Distribution

Task:

Q 010: Marketing research

Definition: Process should include the following:

- define terms related to marketing research
- identify the four "P's" of marketing—product, price, promotion, place
- identify ways that industry applies consumer demand to marketing
- describe reasons a company has to be careful when making a sales forecast
- identify marketing research procedures
- describe methods used by companies to determine the cost of producing a product

Process/Skill Questions

Q 020: Transportation in industry

Definition: Process should include the following:

- define terms related to transportation in industry
- identify different modes used by industry to transport products
- identify modes of transportation used at your training site
- explain the benefits and drawback for various modes of transportation
- describe why an industry may choose to use one specific mode rather than another
- describe how demand by consumers may affect the mode of transportation selected by a company

Process/Skill Questions

Q 030: Consumer satisfaction

Definition: Process should include the following:

- define terms related to consumer satisfaction
- describe actions industry may take with a faulty product
- describe procedures for faulty product identification
- describe why an industry might choose to do a consumer survey
- describe how an industry produces consumer satisfaction

Process/Skill Questions

Q 040: Packaging strategies

Definition: Process should include the following:

- define terms related to packaging strategies
- identify ways that an industry applies consumer demand to packaging
- describe product packaging used for products at your training site
- describe the importance of packaging in retail marketing

Process/Skill Questions

Q 050: Industrial sales and service

Definition: Process should include the following:

- define terms related to industrial sales and service
- identify types of service offered by industry
- describe how advertising affects product sales
- provide examples of selling methods for a product
- describe the importance of strong sales to an industry
- describe how sales are related to marketing
- describe the importance of servicing products
- explain what an industry does to form a sales strategy

Process/Skill Questions

DUTY R:
Industrial Competition

Task:

R 010: Competition among consumers

Definition: Process should include the following:

- define terms related to consumer effect on industrial competition
- describe why consumers may decide to buy a product from different companies
- describe the importance of maintaining a quality product
- identify solutions for poor quality in a product
- describe how consumer demand affects competition

Process/Skill Questions

R 020: Competitions among nations

Definition: Process should include the following:

- define terms related to industrial competition among nations
- identify products that directly impact competition among nations
- describe how the economy of a nation is affected by competition
- identify both positive and negative factors of foreign trade
- describe ways that nations can have balanced foreign and domestic trade

Process/Skill Questions

DUTY S:
Industrial Personnel Technology

Task:

S 010: Management in industry

Definition: Process should include the following:

- define terms related to management
- describe the importance of management in an industry
- discuss the main objectives of management in an industry
- describe current trends that may influence management in industry
- describe how management can affect employee placement and development

Process/Skill Questions

S 020: Mid-level management

Definition: Process should include the following:

- define terms related to mid-level management
- identify the functions of mid-level management personnel
- identify the authority and responsibilities of mid-level management in industry
- describe methods and procedures used in mid-level management
- describe how mid-level managers can relate with employees at different levels
- identify advantages and disadvantages of working as a mid-level manager

Process/Skill Questions

S 030: First-line supervisor

Definition: Process should include the following:

- define terms related to first-line supervisors
- identify the responsibilities and job duties for the first-line supervisor
- describe the importance of the supervisory link between management levels
- describe how information is channeled to the first-line supervisor

Process/Skill Questions

S 040: Labor and labor organizations

Definition: Process should include the following:

- define terms related to labor in industry
- describe the relationship of labor to management
- identify types of organized labor
- compare characteristics of organized and unorganized labor
- identify reasons that workers choose to join or not join a labor union
- describe changes that have come about in the labor force in the past 10 years
- discuss the effect of labor productivity on industry
- explain the responsibilities of supervisors and management in labor agreements

Process/Skill Questions

S 050: Industrial decision making

Definition: Process should include the following:

- define terms related to industrial decision making
- identify types of personnel involved in industrial decision making
- identify types of data needed for specific industrial decisions
- Explain the advantages of involving all levels of workers in the decision-making process
- explain basic decision making areas that might concern an industry
- formulate a decision pertaining to a specific job

Process/Skill Questions

S 060: Intracompany mobility

Definition: Process should include the following:

- define terms related to intracompany mobility
- distinguish between line and staff personnel in an organizational structure
- lay out the line and staff organization for your work training site
- explain how vertical movement of personnel works in an industry
- explain how horizontal movement of personnel works in an industry
- describe how responsibilities of personnel change as they advance vertically

Process/Skill Questions

S 070: Employer-employee relationships

Definition: Process should include the following:

- define terms related to employer-employee relationships
- identify an employee's responsibilities to the company for which he or she works
- identify common conditions of employment
- identify areas in which most companies have established policies
- identify elements that an employee expects of an employer
- identify the basic needs according to Maslow's Hierarchy of Needs
- explain what management expects from subordinates
- explain the subordinate's wants and needs in relation to being on the job

Process/Skill Questions

DUTY T:
Outlook for the Future

Task:

T 010: Personal occupational decisions

Definition: Process should include the following:

- define terms related to personal occupational decisions
- identify personal needs for gaining employment
- describe what types of personal needs may become important in the future
- identify sources of information for forecasting and finding particular jobs
- describe the importance of the geographic location of a job
- research the geographic location for jobs in Arkansas for which you are training
- describe methods of developing satisfaction with work and employment
- describe the importance of fringe benefits to workers
- develop a list of fringe benefits provided at your training site
- identify the typical steps in securing employment
- evaluate potential employment opportunities
- describe how the economy affects the job market
- explain how technology affects occupation forecasting

Process/Skill Questions

T 020: Establish future goals

Definition: Process should include the following:

- define terms related to establishing future goals
- identify factors that contribute to employee advancement
- explain the importance of giving advance notice before quitting a job
- identify alternative routes in education available to employees
- identify positive and negative behaviors that may affect job performance
- identify factors that help obtain, maintain, and enhance development in a job field
- identify factors that contribute to responsible citizenship
- explain the importance of practicing good citizenship
- explain the methods of making long-range goals
- explain how training would relate to goal setting

Process/Skill Questions

General Safety

DUTY : GS (General Safety)
General Safety Practices

Task:

GS 001: Follow personal safety guidelines

Definition: Process should include the following:

- identify and comply with personal safety guidelines
- demonstrate understanding of clothing safety guidelines and regulations—hard hat, hard-soled shoes, eye protection, long trousers, shirt with sleeves
- describe the impact of positive and negative behavior on personal safety
- identify hazards of wearing jewelry while working with tools and equipment

Process/Skill Questions:

- What is the purpose for features of various safety clothing and other safety items?
- What are the steps to identify, report, and correct an unsafe working condition?
- What hazards exist for people wearing jewelry while working in the laboratory?

GS 002: Utilize tools and equipment safely

Definition: Process should include the following:

- identify and use safe working practices for common hand tools found in the industry
- identify and use safe working practices for equipment and power tools found in the industry
- explain and demonstrate safe working practices related to electrical hazards, including lockout/tagout procedures for inoperable tools and equipment
- inspect hand and power tools to ensure proper working condition
- clean and store tools in an organized manner
- demonstrate safe use of ladders
- describe the use of fall-arrest systems

Process/Skill Questions:

- What injuries may occur if a tool is used improperly?
- What items or conditions should be checked to ensure a ladder is set up properly?
- What conditions will cause a tool or piece of equipment to be unsafe?

GS 003: Comply with fire and hazardous material guidelines

Definition: Process should include the following:

- identify fire hazards and methods for fire prevention
- identify procedures for fire reporting
- describe methods to extinguish fires
- identify appropriate handling for hazardous material information
- describe appropriate techniques for handling or disposing of hazardous materials
- demonstrate appropriate measures when handling hazardous materials.
- describe information contained on Material Safety Data Sheets (MSDS)
- Locate and interpret MSDS

Process/Skill Questions:

- What is the procedure for obtaining information for handling a hazardous material?
- Outline the steps to report a fire within the laboratory area.

GS 004: Report injuries

Definition: Process should include the following:

- describe immediate oral reporting of injury to supervisor
- describe procedures to report accident/injury to students or instructor
- describe procedure for a written report of injury, including date, extent of injury, and circumstances

Process/Skill Questions

- What are the necessary steps to report an accident or injury?
- Who should be contacted first in the case of an accident?

GS 005: Inspect work place for safe working environment

Definition: Process should include the following:

- inspect ladders, scaffolding, etc., for unstable or improperly erected condition
- identify location of electrocution hazards in the workplace
- describe procedures for removal of job/work-site debris
- describe conditions for properly storing materials
- identify methods to correct hazardous conditions
- describe proper methods of storing materials
- identify air quality hazards

Process/Skill Questions

- What conditions cause a ladder to be unsafe?
- What hazards can be caused by work-site debris?

GS 006: Report unsafe personal, environmental, and equipment safety hazards

Definition: Process should include the following:

- provide oral safety statements based on observation
- document hazards, including date, time, location, and individuals involved
- submit written safety report to supervisor

Process/Skill Questions

- What is the procedure for oral reporting of a hazardous condition?
- What type of hazards are possible in the laboratory area?

GS 007: Participate in safety training programs

Definition: Process should include the following:

- participate in safety training sessions
- demonstrate knowledge and skills gained from program topics

Process/Skill Questions

- What safety equipment and materials are located in the laboratory area?
- What safety information will help you the most in avoiding injury in the laboratory area?

GS 008: Practice safe lifting and carrying procedures

Definition: Process should include the following:

- describe safe lifting and carrying procedures
- identify possible injury resulting from improper lifting and carrying techniques
- demonstrate safe lifting and carrying techniques

Process/Skill Questions

- What injuries are most likely to occur from improper lifting of a heavy object?
- What weight is considered the heaviest that should be lifted with the arms and legs?

SkillsUSA
Task Definitions

DUTY A: **Self-improvement**
Task:
A 001: Completing a self-assessment and identifying individual learning styles *Definition:* Process should include the following: • identify and list individual strengths • identify and list individual areas in need of improvement Process/Skill Questions
A 002: Discovering self-motivation techniques and establishing short-term goals *Definition:* Process should include the following: • develop a list of short-term goals • discuss ways to change or improve lifestyle appearance and behavior **Process/Skill Questions**
A 003: Determining individual time-management skills *Definition:* Process should include the following: • prepare and keep a time journal • discuss ways to improve time management skills Process/Skill Questions
A 004: Defining future occupations *Definition:* Process should include the following: • search Internet for career opportunities within specified fields of study • prepare a presentation on a specified career area Process/Skill Questions
A 005: Developing awareness of cultural diversity and equity issues *Definition:* Process should include the following: • research a tradition modeled by an individual's family • develop personal philosophy statements regarding gender equity Process/Skill Questions

A 006: Defining the customer

Definition: Process should include the following:

- differentiate between external and internal customers
- discuss factors which contribute to poor customer relationships

Process/Skill Questions

A 007: Recognizing benefits of doing a community service project

Definition: Process should include the following:

- discuss and list ways to become involved in the community
- develop a community service project

Process/Skill Questions

A 008: Demonstrating effective communication with others

Definition: Process should include the following:

- identify and list personal barriers to listening
- develop personal plan to overcome barriers to listening

Process/Skill Questions

A 009: Participating in a shadowing activity

Definition: Process should include the following:

- summarize experience of job-shadowing activity

Process/Skill Questions

A 010: Identifying the components of an employment portfolio

Definition: Process should include the following:

- identify parts of a portfolio
- design a personal employment portfolio

Process/Skill Questions

A 011: Listing proficiency in program competencies

Definition: Process should include the following:

- complete an interpersonal competency assessment

Process/Skill Questions

DUTY B: **Civic, Social, and Business Awareness**
Task:
B 001: Measuring/modifying short-term goals *Definition:* Process should include the following: • discuss steps to pursue short-term goals Process/Skill Questions
B 002: Identifying stress sources *Definition:* Process should include the following: • List personal sources of stress. • Discuss techniques to cope with individual sources of stress Process/Skill Questions
B 003: Selecting characteristics of a positive image *Definition:* Process should include the following: • discuss actions and traits that lead to a positive image • discuss actions and traits that lead to a negative image Process/Skill Questions
B 004: Demonstrating awareness of government, professional organizations, and trade unions *Definition:* Process should include the following: • identify state governor, legislators, and senators • identify professional organizations pertaining to specific career areas Process/Skill Questions
B 005: Applying team skills to a group project *Definition:* Process should include the following: • form a team to develop a class project Process/Skill Questions
B 006: Observing and critiquing a meeting *Definition:* Process should include the following: • attend a formal meeting held within the community • critique the attended meeting Process/Skill Questions

B 007: Demonstrating business meeting skills

Definition: Process should include the following:

- list and discuss the basic rules to ensure an orderly and business-like meeting
- role-play appropriate meeting skills

Process/Skill Questions

B 008: Demonstrating social etiquette

Definition: Process should include the following:

- role-play appropriate social behavior
- differentiate between good and bad manners

Process/Skill Questions

B 009: Completing survey for employment opportunities

Definition: Process should include the following:

- gather information on a particular employment opportunity of interest
- conduct Internet search of a specific career area

Process/Skill Questions

B 010: Reviewing a professional journal and developing a 3- to 5-minute presentation

Definition: Process should include the following:

- develop a presentation on the content, purpose, and distribution of a particular professional journal

Process/Skill Questions

B 011: Identifying customer expectations

Definition: Process should include the following:

- list and discuss customer expectations
- discuss consequences of unmet customer expectations

Process/Skill Questions

B 012: Completing a job application

Definition: Process should include the following:

- obtain a job application from various businesses in the community
- conduct a mock job interview

Process/Skill Questions

B 013: Identifying a mentor

Definition: Process should include the following:

- define *mentor*
- discuss ways in which a mentor can help an individual meet career goals

Process/Skill Questions

B 014: Assembling your employment portfolio

Definition: Process should include the following:

- develop an employment portfolio

Process/Skill Questions

B 015: Exploring supervisory and management roles in an organization

Definition: Process should include the following:

- examine an organizational chart
- discuss responsibilities of managers and supervisors

Process/Skill Questions

B 016: Recognizing safety issues

Definition: Process should include the following:

- discuss safety issues within a given career area

Process/Skill Questions

B 017: Evaluating your proficiency in program competencies

Definition: Process should include the following:

- define task and competency
- list competencies associated with a specific career area

Process/Skill Questions

Technical and Professional Curriculum Frameworks
Introduction

Purpose

This section of the framework contains material to help instructors in technical and professional programs to reinforce basic skills in the areas of reading and writing, math, and science. The technical portion of this guide takes a more direct approach by using specific duty and task listings, but changes in the academic section lead in a more general direction. The reason for this is simple: all good instructors do not teach in the same way. However, all good instructors share the trait of being able to connect their material to everyday life. For example, understanding concepts related to heat is important for cosmetology students as well as lathe operators in manufacturing plants. However, each program will probably take a different approach in the amount of detail and examples relating to heat concepts. Both groups require basic science knowledge of principles relating to heat, but the application of the principles will be different.

Basic Skills: The Content Areas

Included in this guide are materials to support basic skills in reading and writing, mathematics, and science. The overall approach taken here is a move toward problem-solving skills. By problem solving, we mean the ability to take information and use it for a purpose—to take action, make decisions, predict outcomes, suggest improvements. Another term for these thinking skills is a general "literacy."

Literacy skills have always been in demand in the workplace. A quick review of workplace training programs and other literature regarding adult education demonstrates that the need for a literate workforce is still one of the most pressing problems employers face today. Indeed, many employers (from small- and medium-sized businesses to Fortune 500 companies) have spent hundreds of millions of dollars on in-house basic skills training programs.

What constitutes a literate workforce? There are many definitions for literacy and hundreds of tests that measure it, but when employers are asked what they're looking for in potential new hires, the answers are general: they want individuals who can read and write, show up on time, think and solve problems, and keep their personal lives in order (that is, don't bring a drinking problem into the workplace).

Viewed in this way, the words "literacy" and "literate" are good terms for what educators are trying to instill in their students, the future workforce. The more common definition (being able to read and write) is certainly appropriate, but the additional definitions (knowledgeable, educated, well-informed) are also apt. It is the broad sense of "literate" that we use to guide instructors on what to cover in the classroom. No matter which technical and professional area is being focused on, no matter how technical the terminology is, instructors are given the task of helping students take information, break it down into necessary parts, process details, and come away with an understanding of some sort. This is "literacy," and the process is the same for every subject area—teaching students how to think and solve problems.

Format

Each section includes a two-column table. Skills are listed on the left side; suggestions for implementing these skills into the curriculum are listed on the right side. Each suggestion is written in such a way that it can be tailored to most technical and professional programs.

Using the Guide

This guide was prepared with the following four concepts in mind:

- The instructor is *aware of the need* for students to improve their basic skills.
- The instructor is the *best-qualified person* to decide how to include this material in the classroom or lab. The students' abilities and needs should drive the instructor in deciding how to use, expand, or modify these topics.
- The instructor *already has curriculum that works* for his or her students. Therefore, the suggestions for reinforcing basic skills

- must be easy to implement,
- must stand alone,
- do not need to be taught in a particular order, and
- must be open-ended enough to be useful for any technical and professional program.

- ***Time is limited.*** Unless there are quick ways to reinforce basic skills, changes to the curriculum will not be made. Teaching basic skills in the context of technical material will help students make connections that are more memorable and will require no additional lesson planning. Just as instructors incorporate updates in technical knowledge, they can add basic skills concepts as well. Adding a few concepts at a time will help students perform better in the lab as well as on tests and evaluations.

Methods

The following methods may help instructors decide how to increase basic skill knowledge:

- *Collaborative projects*—how could a joint project between regular education teachers and technical and professional instructors reinforce concepts for both programs?
- *Outside assignments*—would students benefit from an outside assignment explaining how a basic math (science, reading) concept ties to a process in the lab?
- *Extra credit*—students needing extra credit can research outside topics and turn in a short summary of material.
- "*Need-to-know" assignments*—students prepare a bulleted list of the basic concepts in science they need to know to correctly perform engineering and technology operations in the lab.
- *Question of the day*—assigning a few daily math problems for students to answer at the beginning of class allows the instructor to set the tone for the material. It also gives students an immediate goal when they enter the classroom and

teaches them to stay on task. Bonus points may be awarded at the end of the week, quarter, semester, etc.

- *Two-minute oral presentations*—students who need to practice speaking skills can be asked to give a two-minute oral presentation at the end of class summarizing the main points for the day. Or a two-minute presentation at the beginning of class can recap the material from a previous class.
- *Connecting with workers*—students can poll parents, friends, area employers, or other people to find out the top five basic science skills needed on the job.
- *Direct questioning*—include a few basic knowledge questions in a presentation. Award points to groups based on correct answers.

Resources

In creating the academic reinforcement material for the technical and professional frameworks, we used a number of source documents and resources.

- The English language arts, science, and mathematics components of the *Curriculum Improvement Project* by Dr. Willard Daggett were consulted to ensure that the top-ranked skills in those areas would be reflected in the academic support material. The English language arts and science components have many linkages to the material included here. (The higher-level math skills, such as trigonometry, were not included in this document.)
- Data from work with Arkansas employers—the Workplace Skills Enhancement Program (WSEP) at the University of Arkansas at Little Rock (UALR) has completed many training projects and job profiles for employers in Arkansas. Our constant contact with workers and employers provides a tremendous amount of data that we use in designing customized training programs and in working on projects such as curriculum frameworks. Also, the staff of WSEP has experience teaching in Arkansas public schools, the U.S. military, and Job Corps.
- Additionally, other groups within UALR (the Labor Education Program, the Institute for Economic Advancement, and the College of Business) provide resources regarding health and safety information, labor unions and their role in

the workplace, computer and information technology, and other training and outreach program data.

- U.S. Department of Labor—the U.S. Department of Labor has many online documents and publications that support workers and issues regarding the workplace. (Work by Philippi and Greenan, 1988, on workplace skills was especially helpful.) Visit the website at www.dol.gov.
- The Occupational Safety and Health Administration provides online and other resources for instructors and professionals. For topics relating to safety and health, visit www.osha.gov.
- Multistate Academic and Vocational Curriculum Consortium (MAVCC) is an organization that develops competency-based curriculum. For more on MAVCC see www.mavcc.org.

ACADEMIC STANDARDS FOR READING AND WRITING

Strategies for Reinforcement in the Technical and Professional Classroom

Note:
*** indicates industry-related materials, handouts, notes, etc.**

Objective	Classroom Applications to Industry
Present/review and discuss/master **the list of skills employers want for the workplace regarding reading and writing**	Use the list of skills employers want to introduce students to the requirements of the workplace. Depending on students' ability levels, any of the following methods may be used to increase their understanding of the concepts: • discussion, • interviewing parents or other adults in the workplace about the skills required, • interviewing employers about the skills in terms of importance, • identifying workplace situations in which certain skills become more important than others, • researching adult education programs to learn why deficits in these areas must be remediated and the cost spent yearly on these programs, or • researching the topic of adult literacy.
Answer **simple comprehension or recall questions from a lecture or from written material**	Provide 2 examples of workplace materials* on students' reading level. With the first, allow students to read information and then answer brief recall questions. With the second example, read aloud the material but do not give a handout. Ask brief recall questions. Compare the differences. How do students retain information better—orally or visually? Discuss learning styles and impact on the job.

Follow/give **oral instructions**	Using instructions for a hands-on task, have students give oral instructions to a partner or group. Rate the effectiveness of the speaker.
Follow/give **written instructions**	Using a short list of instructions for a hands-on task, have students give written instructions to a partner or group. Rate the effectiveness of the speaker.
Show **the difference between relevant and irrelevant details**	Using a copy of workplace materials*, have students underline relevant or important details in red, irrelevant or less important details in blue.
Sort **objects based on x number of criteria**	Using workplace materials*, sort a group of objects based on characteristics identified by instructor (e.g., by color, shape, defect, or a combination of these).
Recognize/identify **technical vocabulary**	Using workplace materials*, highlight technical vocabulary terms. Create a class dictionary of industry-related technical vocabulary. Students may add illustrations or diagrams. Each student receives a copy of the final product. Emphasize skills such as alphabetical order, guidewords, prefixes, suffixes, and pronunciation guides.
Read **aloud**	Read aloud from workplace materials* in groups or individually.
Identify/explain **symbols, abbreviations, and acronyms relevant to subject area**	Using workplace materials*, highlight symbols, abbreviations, and acronyms. Create a table with one column for each of symbols, abbreviations, acronyms. Classify each one and write in the meaning.
Understand/use **rules of grammar, usage, spelling, punctuation**	Identify missing punctuation marks, misspelled words, incorrect uses of grammar from workplace materials*. Correct the mistakes.

Discuss **uses and purposes of a variety of workplace communication tools**	Find examples of a business letter, memo, report, brochure, proposal, schematic, map, and diagram.
Duplicate **process demo by instructor**	Using a workplace process, demonstrate steps to complete and have students perform individually or in groups.
Notice/apply **word analysis techniques**	Using workplace materials*, identify prefixes, suffixes, or roots that indicate meaning (e.g. therma = heat).
Match **parts from photographs or diagrams to actual objects**	Using workplace materials*, follow a sequence of pictures or diagrams to build, create, or copy an item or process.
Read **for main ideas and for details**	Use a graphic organizer to show main ideas and supporting details.
Distinguish **between fact, opinion, and inference**	Collect examples of materials based on fact or opinion/inference. Ask students to underline key terms that indicate the presence of facts or opinions.
Distinguish **between rows and columns;** *identify* **a cell as a block where a row and column intersect**	Using charts or tables from workplace materials*, discuss the reasons for this format. Identify the quantity in a particular cell.
Select/use **appropriate resources and reference tools**	Explain the uses for the following: dictionary, thesaurus, almanac, atlas, card catalog, encyclopedia. List reasons for choosing one reference tool over another. Use reference tools to answer questions related to industry or current events.
Paraphrase **written or oral material into summary form**	Using workplace materials*, determine the best way to condense or shorten the material so as to give an overview to a layperson. Using a set of guidelines appropriate to students' level in length and detail, summarize the information into bullet points.

Interpret/fill out/complete **forms and records**	Using workplace materials*, answer basic questions (e.g., summarize the list of parts from an inventory). Using blank forms or documents, fill in details. Pay close attention to directions. Critique work with a partner. Create a form or document to be used in a workplace process.
Use/develop **a process for remembering details**	Use pneumatic devices to organize and remember details. Pneumatic devices include semantic maps, thought webs, and other creative tools to organize thinking.
Proofread/correct **mistakes in written drafts**	Using a newspaper article, locate and mark mistakes in grammar, punctuation, or usage. Correct mistakes in written drafts.
Examine **different types of writing used in the workplace (reports, memos, brochures, logs, blueprints, formulas, etc.)**	Gather samples of workplace materials*. Identify each by type. Compare and contrast the difference between • audience (who the document is written for), • length, • background information/education needed to understand material, • level of detail, and • organization and layout of the document.
Understand **the writing process**	To apply the writing process, create a workplace communication tool to be used for a specific purpose. Prewrite: Brainstorm, gather facts, or do research to create a business letter, memo, report, brochure, proposal, schematic, map, or diagram. Identify the audience. Determine the purpose of the document.

	Write: Create a first draft. Revise and Edit: Make changes to ensure accuracy. Look at the writing from a different point of view. Shorten or make more concise where possible. Use white space, bold print, and other formatting details to make the document easy to read. Publish: Decide on the best format for the final copy (size, type of material, layout, graphics, etc.). Publish the final draft.
Identify/create **sentences of different types**	Using workplace materials*, find sentences of varying types. Examples include simple sentences (subject + predicate) and complex sentences (subject + predicate including clauses). Write sentences, paragraphs, or essays, using sentences of different types (e.g., write a 2-paragraph summary of today's lesson).
Identify/use **contractions correctly**	Using workplace materials*, locate contractions (e.g., isn't, I'll). Identify misuses of contractions. Write a short list of directions relating to an industry process, and use as many contractions as possible.
Identify/use **correctly commonly misspelled words**	Using a list of commonly misspelled words, locate errors in the media (newspaper articles, Internet sites, magazines). Ask each student to identify his/her problem words from the list. Attempt to incorporate problem words into class activities (e.g., add them to a list of work instructions).

	Give short weekly quizzes focusing on 5 words per week. Award bonus points.
Identify/use correctly **English irregular verbs**	From a list of irregular verbs, review the uses of each. Ask each student to identify his/her problem irregular verbs from the list. Attempt to incorporate problem verbs into class activities, such as making a collection of mistakes from print.
Identify/use **signal words and other cues to improve writing**	Use a list of signal words, and discuss their purpose in writing. (Signal words are words that raise a flag to a reader to pay attention.) Examples— Signal words showing emphasis: *Most of all*, *It should be noted*, *Of course* Signal words showing a conclusion: *Lastly*, *In summary*, *Finally* Identify common signal words in workplace writing, especially in sequenced lists. Write a list of work instructions, using signal words.
Identify **components of workplace documents, such as blueprints, schematics, floor plans, and other industry-related documents**	Label the parts of a workplace document.
Place **steps in proper sequence**	Using a list of steps or pictures, cut them apart so that students can place them in the proper order.
Analyze **cause and effect**	Experiment with cause and effect in the classroom (e.g., change the sequence of events in a process).
Determine **missing information**	Locate the information that is missing from a problem, and explain why the problem cannot be solved without it.

	To reinforce concepts, use a completed problem and remove the important details. Ask students if they can identify what's missing.
Differentiate **between tools used for a job**	Given a list of tools and a list of functions, identify the most efficient tool for each task.
Assemble or disassemble **objects**	From a list of oral or written instructions, assemble an object or complete a process. Students write the instructions for disassembly.
Cross-reference **materials to compare information**	Using more than one source document, compare the information given.
Interpret **reasoning behind rules or regulations**	Using workplace materials*, make a list of possible reasons or justifications for a safety guideline, regulation, etc.
Show **contrasts between approaches**	Given a workplace scenario, write a brief approach to solving the problem. (Working in groups would be beneficial.) Compare and contrast each approach from the perspective of a worker, manager, and supervisor.
Organize **data in a new format**	Using workplace materials*, organize the information into a new format.
Prove **a rule or method's sufficiency**	Perform an experiment to determine how much tolerance is acceptable in a case study (e.g., find the range of drops of red dye sufficient to match the standard red color used in latex paint).
Show **relationships between two or more systems**	Using 2 or more partners related to industry, show or explain how they are interrelated (e.g., explain the relationship between social workers and hospitals).
Given examples of emergency situations, *identify* **real-world course of action**	Using an emergency situation common to your industry, outline a step-by-step plan for action.

Identify **variables that affect the outcome of a process**	Experiment with or predict variables that affect the outcomes for a process (e.g., weather patterns that adversely affect a process, such as building a road).
Infer **situations that meet guidelines when complete information is not available**	Given a policy or industry standard that has debatable interpretations, list possible situations that can arise that do not have clear solutions in the policy. Discuss or debate the issues.
Compare **finished products with a set of guidelines**	Compare a set of objects with a set of guidelines (e.g., analyze a batch of parts and document how they do or do not meet a set of quality assurance guidelines). List any discrepancies (parts that do not meet guidelines), and categorize them by type (e.g., burns, holes, etc).
Identify **preventative measures for maintenance of a system**	List the needed routine maintenance to keep a system working properly.
Predict **new standards or rules that may become necessary in the future**	Identify recent areas of change or development in your industry. Discuss potential future needs or developments that may occur (e.g., potential need for better training requirements for airport personnel).
Improve **a process by streamlining (locating waste) or decreasing lost time**	Examine a process in industry in step-by-step detail. Suggest ways to decrease time needed or make the process more efficient. Isolate the cause of failure in a process by performing an experiment.
Prepare **a model explaining a concept**	Build, draw, or create a model that explains a concept (e.g., show a need for environmental standards for water or air pollution).

[*] Fry, Edward, Kress, Jacqueline, and Fountoukidis, Dona. *Reading Teacher's Book of Lists,* 4th ed. ISBN 0-13-028185-9.

ACADEMIC STANDARDS FOR MATHEMATICS

Strategies for Reinforcement in the Career and Technical Classroom

Note:
*** indicates industry-related materials, handouts, notes, etc.**

Topics Listing
Problem Solving
Operations and Calculations
Applications
Data Analysis and Display

Objectives	**Classroom Applications to Industry**
Present/review and discuss/master **the list of skills employers want for the workplace regarding mathematics**	Use the list of skills employers want to introduce students to the requirements of the workplace. Depending on students' ability levels, any of the following methods may be used to increase their understanding of the concepts: • discussion, • interviewing parents or other adults in the workplace about the skills required, • interviewing employers about the skills in terms of importance, • identifying workplace situations in which certain skills become more important than others, • researching adult education programs to learn why deficits in these areas must be remediated and the cost spent yearly on these programs, or • researching the topic of adult literacy**.**
PROBLEM SOLVING	
Examine/apply **problem-solving process**	Define the problem— • What is being asked? • Decide on a type of solution. Is it a multistep or single-step question? Try any of the following: • estimate an answer, • draw a diagram, • find a pattern, • guess and check,

	• logical reasoning, • make a graph, • make an organized list, • make a table, • solve a simpler problem, • use a simulation, • work backwards, or • write an equation. Locate information you need. Do you have all the components? Get missing information. You may need to perform some other calculations. Calculate. • Look at the answer. • How should the remainder be expressed? Check the solution. • Is it reasonable?
OPERATIONS AND CALCULATIONS	
Read, write, **and** *count* **numbers**	Read and write numbers (especially focus on very large and very small numbers where mistakes are common). Give a weekly quiz asking students to compare and sequence numbers. Example: 0.4445 ___ 0.4455 > or < Put these in order from smallest to largest: 0.66, 0.677, 0.67
Round **numbers**	Discuss your industry's use of decimals. Identify the place values needed to adequately perform a job. For example, a quality assurance technician who works on the line in a manufacturing plant may need to use numbers through the ten-thousandths decimal place.

	Take a series of sample measurements, and round them to the nearest decimal place identified by the instructor.
Estimate **numbers**	The skill of making close estimations is tied to understanding accuracy. Discuss real-life situations in which estimation is used. Discuss the practice of estimation before calculation. Regular practice in estimating before calculating will teach students where they make errors and will increase their estimation skills. Discuss work situations in which estimation skills are required and possible consequences of making estimation errors. (For example, is an estimate appropriate for inventory purposes? For ordering supplies?)
Compute **averages**	Discuss averages in general terms. Calculate the average temperature, average rainfall or precipitation, average number of students per class, and other relevant examples. Using workplace materials*, calculate a series of averages. For example, • Take 10 different measurements of a piece of pipe using a micrometer. • Compare the measurements. • Find the average of all the measurements. • Compare the average to the smallest and largest measurement. • Discuss the effects on quality. When is an average an acceptable bench-mark measurement?
Calculate **with whole numbers;** *perform* **one-step problems with basic operations**	Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of addition, subtraction, multiplication, and division.
Perform **problems that require an understanding of the order of operations**	Using workplace materials*, make a list of situations or problems that need more than one step to perform them.

	If the procedures (add, subtract, multiply, divide, etc.) are on the same level of importance, such as adding or subtracting, then the order of operations will not impact the way the problem is solved. If a problem requires more than one level of operation to solve (e.g., dividing and adding), work the problem correctly by performing the division part first and then the addition. Rework the problem using addition first. Compare the answers. Discuss the importance of reasoning skills to verify that an answer makes sense.
Understand **the relationship between decimals, fractions, and percentages**	Make a table comparing fractions, decimals, and percentages.
Compute **with fractions, decimals, and percentages;** *show* **understanding of the relationship between them**	Create sample problems using fractions that relate to everyday situations. ▪ Poll the class on interesting topics (favorite food). Convert whole numbers to fractions. Votes: pizza—10; salad—2; BBQ—8 10+2+8 = 20 (recognize denominator value) $\frac{10}{20}$ Pizza $\frac{2}{20}$ Salad $\frac{8}{20}$ BBQ ▪ Add the fractions. $\frac{10}{20} + \frac{2}{20} + \frac{8}{20} = \frac{20}{20}$ ▪ Convert fraction to whole number. (Total answer equals 1 class's worth of answers.) $\frac{10}{20} + \frac{2}{20} + \frac{8}{20} = \frac{20}{20} = 1$ ▪ Convert fractions to percentages. $\frac{10}{20}$ means 10 divided by 20 = 0.50

	Move decimal 2 places right. 0.50 = 50% $\frac{2}{20}$ means 2 divided by 20 = 0.10 0.10 = 10% $\frac{8}{20}$ means 8 divided by 20 = 0.40 0.40 = 40% 50% + 10% + 40% = 100% Notice the total adds to 100%. So, $\frac{20}{20} = 1 = 100\%$ Using workplace materials*, calculate work-related questions, using fractions, decimals, and percentages. Calculate shipping costs for Internet purchases (such as music from amazon.com).
Solve **formulas and equations**	Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of equations. ▪ Work left to right. ▪ Use order of operations. ▪ Place numbers on one side, variables on the other side.
Obtain **squares and square roots**	Review the methods for calculating squares, square roots, cubes, and cube roots. Use industry-related formulas to demonstrate examples. Compare the difference between the 2 common answers to 3^2 (answer = 9, not 6). How would an incorrect value affect the work on the job?
Convert **units of measure:** *recognize* **components of measuring systems (U.S. and metric) for length**	Discuss industry measures and terms relating to length.

Convert **units of measure:** *recognize* **components of measuring systems (U.S. and metric) for mass/weight**	Discuss industry measures and terms relating to mass/weight.
Convert **units of measure:** *recognize* **components of measuring systems (U.S. and metric) for volume**	Discuss industry measures and terms relating to volume.
Measure **with a certain degree of accuracy.**	Estimate measurements. Using workplace materials* and tools, take measurements of work-related and classroom items. Depending on ability level, students may measure to the nearest foot, inch, centimeter, etc.
APPLICATIONS	
Solve **word problems**	Help students feel more comfortable with word problems by placing simpler problems in word problem form, or take concepts students have already mastered and ask them to write word problems for each other to solve.
Select/apply **mathematical formula**	Review a set of math formulas and then a list of sample problems. Decide which formula(s) apply to each problem.
Understand **the importance of time in the workplace**	Using workplace materials*, make a list of workplace scenarios that require using time correctly, such as keeping a timecard or heating a liquid solution for 20 minutes.
Recognize **components of time systems (clocks and calendars)**	• a.m. and p.m. • leap year • military time
Discuss/identify/understand **terms relating to measuring time**	Discuss the units of time measurement and time vocabulary: second, minute, hour, day, week, month, year, leap year, fiscal year, quarter, annual, biannual, etc.
Understand **that time can be expressed in terms of equivalencies**	Show the time equivalencies using fractions. For example: 1 ½ days = ___ hours

	1 day = 24 hours + ½ day = +12 hours 1 ½ days = 36 hours
Compute **time conversions**	Make a table that shows the equivalencies of time units. Compute conversion problems at the appropriate level of difficulty. Examples include • convert minutes to hours, • convert hours to days, and • convert seconds to years.
Calculate **ratio and proportion**	Review fractions when discussing ratio and proportion. Draw common classroom items to scale by finding a conversion rate (1 foot equals 1 inch). Make predictions using ratios. (If each student in class has 3 children, how many children will there be all together? Write the ratios.)
Apply **geometry principles:** *use* **formulas for measuring shapes of 2 dimensions**	Determine the formulas that apply to 2 dimensions—perimeter, area, surface area, etc. Find the perimeter of the classroom. Discuss the perimeter of objects that are not shaped as perfect squares. How does this change the formula for perimeter? Find the area of the tiles on the floor. Find the area of the classroom. Review that all areas are expressed in terms of square units (square inches, square miles, etc.).
Apply **geometry principles:** *use* **formulas for measuring shapes of 3 dimensions**	Review the formulas that apply to 3 dimensions of objects—volume.

	Find the volume of common objects such as soda cans, pizza boxes, etc. Review that volume is expressed in cubic units. Discuss industry-specific needs for these formulas; for example, find the volume of a tank or silo.
Define **terms relating to money**	Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles relating to money. For more advanced students, include terms and principles of economics, finance, or statistics.
Perform **one-step problems involving money**	Make change: count up (rather than backwards) to make change.
Perform **multiple-step problems using money**	Calculate gross and net earnings. Calculate ▪ interest, ▪ sales tax, ▪ percentage off, ▪ sale price, and ▪ profit percentages. Perform banking transactions.
Perform **business-related financial activities**	At a level of complexity appropriate to your industry and to students' ability levels, solve income/expense problems, prepare budgets, etc.
Use **a calculator to perform computations**	Identify appropriate activities that can be performed using a calculator (calculators allow students to concentrate on problem-solving strategies). Award prizes for weekly activities or competitions.

Calculate **measurements taken from measuring devices**	Add, subtract, multiply, and divide measurement numbers by plugging them into formulas.
Perform/prepare **an inventory**	Use a sample group of items to prepare an inventory. Review inventory vocabulary terms. Discuss the math processes that would apply to the inventory process.
DATA ANALYSIS AND DISPLAY	
Recognize **types of visual representations**	• charts • graphs • tables
Interpret **charts, graphs, and tables**	Answer simple questions about charts, graphs, and tables. *Solve* multistep problems involving the correlation of graphs and tables.
Collect/record **data**	As appropriate to industry, practice sampling methods. Discuss safety precautions for sampling. Visit OSHA at the Department of Labor Web site for more details. Practice collecting and recording sample data from your industry (such as measurements taken using a micrometer). Compare class answers. Find the range of answers (maximum and minimum). Find the average. Discuss an acceptable range of answers (±), and graph the results showing the number that fell inside and outside the acceptable range.
Review ***and*** *apply* **principles of probability**	Use real-life examples that are highly motivating to direct the students' attention to probability principles. Example: "I am thinking of a number between 1 and 50. The person who guesses

	the number will receive that many bonus points if he or she can tell me the probability of choosing the number correctly."
Use **probability models to** *predict* **chance events**	Calculate *theoretical probability* of an event (e.g., the probability of rolling a 5 on a die is 1/6). Find *empirical probability* of an event by performing repeated experiments. Compare the 2 probabilities.
Calculate ***and*** *interpret* **statistics**	Identify the importance of using statistics correctly. Bring examples of statistics from the news or media and analyze them. Are they ambiguous? Are they correct? What data is the advertisement trying to get the public to see? For a humorous look at statistics, see *How to Lie with Statistics* by Huff and Geis.
Interpret **plans/blueprints**	Review vocabulary and terms for plans, blueprints, and schematics. Build a plan or blueprint one layer at a time, starting with the basic identifying information. Add layers of wax paper or other transparent drawing material on top of the first layer that allows each layer to be viewed individually or the entire drawing as a whole.
Construct **charts and tables**	Discuss chart types and chart vocabulary. Using workplace or sample data from the class, construct tables and charts. For a daily example, consult *USA Today* online and look for the snapshots section that shows a graph of some sort. Ask weekly bonus questions about the data. Challenge students to bring in examples of charts and graphs containing errors.

ACADEMIC STANDARDS FOR SCIENCE

Strategies for Reinforcement in the Career and Technical Classroom

Topics Listing

General Science-	topics not specific to a content area
Physical Science-	Mechanics and Physics
	Energy and Waves
	Thermodynamics
	Electromagnetism
	Chemistry
	Optics
Life Science-	Cell biology
	Evolution
	Genetics and Heredity
	Human and Animal Development
Anatomy	Ecology
	Viruses
	Bacteria
	Plants
Earth Science-	Earth in Space
	Solar System/Astronomy
	Atmosphere and Weather
	Oceans and Water
	Earth Resources

Note:
*** indicates industry-related materials, handouts, notes, etc.**

Objective	Classroom Applications to Industry
GENERAL SCIENCE	
Present/review and discuss/master **the list of skills employers want for the workplace regarding science skills**	Use the list of skills employers want to introduce students to the requirements of the workplace. Depending on students' ability levels, any of the following methods may be used to increase their understanding of the concepts: • discussion, • interview parents or other adults in the workplace about the skills required, • interview employers about the skills in terms of importance, • identify workplace situations in which certain skills become more important than others, • research adult education programs to learn why deficits in these areas must be remediated; find out the cost to employers to educate adult workers, or • research the topic of adult literacy.
Perform **computations as required to solve problems**	Use the metric system to convert units of measure. Round numbers to correct number of significant figures. Determine percentage of error. Understand validity, reliability, accuracy, and precision.
Apply **scientific method of inquiry**	Identify the steps of the scientific method. Conduct experiments. Understand the following terminology: • conclusions vs. inferences, • variables, • replications, and • samples/sample size

Investigate **science history as it applies to industry**	In groups, research topics in science pertaining to your industry. Have students assign roles for each member of the group. Present findings in report format or in oral presentations. Investigate science ethics. Recognize the processes available for accountability in industry. For example, OSHA has a Safety and Health Program Assessment Worksheet whereby employers can be rated for safety issues. See http://www.osha.gov/SLTC/etools/safetyhealth/form33i.html. [Note: Safety and health is a mandatory subject of bargaining when a workplace is unionized; in both unionized and non-unionized workplaces, an employer cannot create and dominate workplace safety committees (see the National Labor Relations Act).]
Use **scientific instruments to *measure* aspects of the environment.**	Gather data on time, length, mass, pressure, volume, acceleration, or other measurables, using instruments from the job.
Demonstrate **an understanding of data**	List the processes involved in gathering data. Suggest ways data can be grouped or organized. Collect specimens. Show how data can be represented (graphically, etc.). Construct a model to depict a basic concept.
Identify **the seven basic Systeme International (S. I.) units**	• Length – meter, m • Mass – kilogram, kg • Time – second, s • Electric current – ampere, A • Temperature – Kelvin, K • Amount of substance – mole, mol • Luminous intensity – candela, cd Dictionary of units – see http://www.ex.ac.uk/cimt/dictunit/dictunit.htm.

Identify **S. I. derived units**	Choose units appropriate to your industry (hertz, ohm, volt, watt, etc.). Create a picture dictionary demonstrating the concepts.
Review **relevant theories, laws, and models**	As relating to your industry, discuss important theories, laws, and models.
Use **reference tools to solve problems**	Use scientific reference tools (such as the Periodic Table of Elements) to learn more about specific industry concepts
Practice **safe lab procedures**	Handle equipment with care. Demonstrate safety and first aid procedures. Identify harmful substances.
PHYSICAL SCIENCE	
Understand **the cyclical nature of systems**	Show, demonstrate, model, track the cycles of any of the following systems: • growth and decay, • food webs, • weather, or • water.
Analyze/classify **matter according to type**	Identify types of matter (solids, liquids, gases). Which types are predominantly used in your area of industry?
Explain **the concepts of work and power**	Identify machines used in industry. Identify how energy levels change when work or power is increased/decreased. Identify fuel sources used in your industry. Discuss internal and external combustion. Create a model demonstrating the uses of levers and pulleys.
Be familiar **with concepts of motion**	Measure acceleration and deceleration.

	Understand the relationship between speed and velocity by performing experiments. Recognize waves and vibrations as a type of motion. Understand action and reaction. Review laws pertaining to motion.
Understand **concepts related to force**	Show the need for balance of forces acting on an object. Observe centrifugal and centripetal forces in action. Show how friction is created and must be accounted for in using and preserving equipment. Create a chart showing types of lubricants needed in a factory and schedule of maintenance. Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of inertia. Show the relationship between pressure, mass, and weight.
Understand **and** *apply* **principles relating to the atom**	Understand that atoms have a positive, negative, or neutral charge. Classify protons, electrons, and neutrons. Identify ions.
Investigate **forms of and changes in energy**	Discuss how energy is measured. Observe changes in energy relationships. Identify catalysts and reactants. Identify sources of kinetic and potential energy in your industry.
Discuss, apply **principles of electricity and electric currents**	Identify types of circuits and switches.

	Show the difference between direct and alternating currents. Give examples of the best/most efficient use of each. Determine how electricity is measured, and solve problems using these terms. (Example, use Ohm's law to calculate current, resistance, and voltage.) Identify good conductors and insulators and how to choose them. Understand grounding, and create a visual display of grounding safety practices. Include the threat of static electricity. Show the uses of a vacuum tube by building a model. Compare the following ways of generating electricity: • hydroelectricity, • motors, • solar power, • steam/nuclear, • transformers, and • incandescent (light). Show the implications for your industry. As appropriate to your industry, identify electrochemical energy sources (cells, electrodes, batteries) and the processes of oxidation and reduction.
Be familiar **with sound waves**	Compare how sound waves travel between liquids, solids, and air. Examine different types (lengths) of sound waves. Examine decibels safe for human hearing. Identify safety precautions for industry regarding sound tolerance.

	Be able to use correctly the terms below as they relate to your industry. For example, ask students to write a short essay explaining a demonstration from class and including the following terms: • amplification, • audible range, • frequency, • acoustics, • resonance, and • speed.
Be familiar **with principles of heat**	Differentiate between the 3 types of heat transfer—conduction, convection, radiation. Understand that substances expand and contract due to heating and cooling. Identify purpose and types of insulations used. Differentiate between heat and temperature.
Investigate **and** *apply* **concepts relating to temperature**	Use the temperature scales; convert between Celsius and Fahrenheit.
Explain **the concepts of magnetism**	Understand that currents create magnetic fields. Identify materials that are good conductors and the properties that make them such. Understand electromagnetic forces present in earth.
Investigate/apply **chemical properties**	Differentiate between acids and bases. Find pH for substances used in industry. Identify substances used in your industry and classify them by type. Name the major drugs, fertilizers, or additives used in your industry. Define and state examples of chemical reactions. Be familiar with solutions used in your industry.

	Compare saturated and unsaturated solutions. Determine whether a solution is soluble or insoluble. Explain *solute* and *solvent*.
Investigate **forms of and changes in matter**	Compare and contrast physical and chemical changes. Discuss the types of physical or chemical changes that take place in your industry from processing raw materials to manufacturing.
Understand **and apply concepts relating to the elements**	Examine the 4 elements that make up 99% of living organisms—hydrogen (H), oxygen (O), nitrogen (N), and carbon (C)). Element groups • Alkali Metals • Alkaline Earth Metals • Transition Metals • Other Metals • Metalloids • Non-Metals • Halogens • Noble Gases • Rare Earth Elements
Be familiar **with principles of light**	Discuss light as a form of energy. Describe types of lighting systems. Examine the light spectrum and note the relative smallness of visible light. Define *reflection* and *refraction*. Explain how light carries information (by lasers), and show examples of the impact on technology/industry. Identify types of lenses.
Be familiar **with principles of color**	Diagram the main parts of the eye involved in seeing color (rods, cones). Use prisms to split light into the visible spectrum.

	Briefly explore color blindness. What precautions should colorblind individuals take regarding workplace safety? Define situations in which colorblindness impacts a worker's ability to do his or her job.
LIFE SCIENCE	
Explain **the presence of cells as the identifier of all living organisms**	Examine the cells of organic material used in your industry, using books, the Internet, or a microscope. Recognize that cells divide or replicate to promote growth of an organism. Examine the parts of a cell. Compare the cell to a machine. How do the parts function and rely on each other? Give example of one-celled and multiple-celled organisms. Review the classification system of all organisms (kingdom, phylum, etc.). Create a circle graph or pie chart (totaling 100%) showing the relationship (in numbers) between the following groups of organisms: • bacteria, • fungi, • viruses, • insects, • plants, • vertebrates, and • invertebrates. Compare some of the cell processes (active and passive transport) to the processes in your industry.
Understand **the progress of evolution of organisms**	Recognize how a species will adapt to better fit in its environment over time.
Explain **the role of genetics in human development**	Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of heredity, including • half of an individual's genes are contributed by each parent;

	• traits that are inherited are either dominant or recessive from the parent(s); • cell division is by mitosis vs. meiosis; and • disabilities are caused either by genetic/inherited conditions (such as Down's Syndrome) or in accidents occurring after birth, such as brain damage due to a car accident or a stroke.
Investigate/apply **principles of human development**	Describe the life cycle of humans and other animals. Use the concept of human development to explain the need for understanding foundation skills in your area. (For example, children do not run before they walk.) Use this concept to explain other events that occur in a natural order in your industry.
Explore **additional concepts pertaining to humans and other animals**	Give examples of ways organisms adapt to their environment. As relating to industry, review the concepts of • aging, • immune system, • skin and tissues, • blood and hemoglobin, and • disease.
Compare/contrast **the differences between sexual and asexual reproduction**	Determine instances when understanding the concepts of sexual reproduction are important for your industry. Highlight the effects of unsafe working practices on fetuses or the dangers present for pregnant individuals working in industry.
Show **a general understanding of the importance of health**	Explore the cost of lost wages and worker's compensation in the past year due to health problems. Research the most common health problems among workers (workers with safe jobs; workers with most hazards to health, etc.).

Investigate **the food cycle**	Identify food chains, food webs, food pyramids. Show how changes to the food cycle affect the environment and man. Name the food groups.
Understand **nutrition and the body's need for a diet that provides vitamins and minerals**	Show an understanding of body systems (circulatory, nervous, digestive, etc.) as they relate to industry. Identify deficient vitamins and minerals among a particular population (American workers, workers in specific environments, workers who do not go outdoors or who always work outdoors) and the health risks associated with job types (office work, mining work, etc.).
Observe **health code/sanitation requirements**	Research the development of health code and sanitation requirements, including OSHA. Compare/contrast workplaces of 1850, 1900, 1950, 2000 regarding health and safety. Discuss the most common workplace violations of health requirements, and present in a graphic format (e.g., maps, charts). Discuss potential effects of ignoring health requirements. After identifying workplace hazards, create several plans to treat the problem. Debate the benefits of each. To avoid the threat of employers choosing ineffective means of ensuring safety on the job, locate MSDS, first aid stations, personal protective equipment, worker's compensation claims offices/paperwork, etc. Using workplace materials*, locate the section on safety regulations. Ask students to rank order the items. Debate the importance of each. Determine the threat of ignoring regulations. Research which regulations are often disregarded.

	Explore proactive measures students can take to extend their health. Understand the importance of mental health in addition to physical health.
Investigate/apply **principles of anatomy and physiology**	As relating to your industry, explore issues relating to anatomy and physiology. Skeletal system—study the bones of the arm, hand, and neck. Research carpal-tunnel syndrome. Fractures—identify the types of fractures and those most common to your line of work. Learn how to prevent falls.
Understand **basic principles of ecology**	Define *ecology*. Identify 5 major ways in which man interacts with the environment, especially as relating to your industry. Discuss the effectiveness of the media as compared with pro-science groups (such as Greenpeace) on the public's awareness of important environmental issues. Identify any areas of concern regarding waste/waste management in your industry. Show the difference between a niche, community, habitat, and ecosystem. Give examples of herbivores, carnivores, and omnivores. How does your industry use and serve each group? Understand predators' effects on food chains. Identify predators of your industry. Explain the process of decomposition and decay. How does industry interfere with or interrupt these processes?

State **the differences between viruses and bacteria**	Define *viruses* and *bacteria*. Explore viral and bacterial threats present in the workplace. How can they be prevented? How can they be treated? State the benefits of viruses and bacteria. Explain the recent increased resistance to drugs and antibiotics.
Understand **basic concepts relating to plants**	Describe the interchange of oxygen and carbon dioxide between plants. Contrast to the way humans exchange oxygen and carbon dioxide. As relating to industry, review the concepts of • fertilization, • parts of plant and functions of each, • effects of temperature on plants, • need for water and light, and • photosynthesis.
EARTH SCIENCE	
Recognize **Earth's position in the universe**	As relating to your industry, identify relevant topics regarding • asteroids, • comets, • stars, and • galaxies Identify planets in the solar system. Compare and contrast Earth to other planets. Create a model showing the relative size of Earth within our solar system. Use mathematical relationships to make sure the scale is correct (Earth is the size of ___ so the sun should be the size of ___). How do the phases of the moon and sun affect the hemispheres?
Investigate **the history of the earth**	Identify geological, chemical, and other methods of determining the age of an object.

	Demonstrate that fossils and rocks are indicators of previous eras. As a class, create a timeline indicating the age of the Earth. Include the various ages (Ice Age, etc.) and the length of each. Make sure the timeline is drawn to scale. Assign each age to a group and research the following: • weather, • major events at beginning and end of age, • organisms living during this time, and • factors that made the age unique.
Investigate **physical characteristics of the Earth**	Label/model the components of the Earth. Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of gravity. Solve problems of longitude, latitude, and time zones. Create a model of the ratio of land and water on Earth.
Investigate **physical forces acting on the Earth**	Examine erosion and depletion of nonrenewable resources. Identify natural disasters such as hurricanes and earthquakes. Research the effects of a past disaster on a specific industry. Understand, at a level of complexity appropriate to your industry and to students' ability levels, basic principles of plate tectonics (the Earth's surface is broken into large plates; movements of these plates over time causes earthquakes and other geologic activity).
Explain **the basic components of Earth's rotation**	Understand that the Earth spins on its axis at an angle of 23½ degrees

	Identify the period of one complete rotation as a day; longer cycles of rotations identify the seasons. Discuss time zones.
Identify **the Earth's atmosphere and its components**	Identify the main elements in the Earth's atmosphere (nitrogen and oxygen). Identify layers of the atmosphere and the ozone layer. Explain concepts of air pressure.
Understand **basic principles of the solar system**	Demonstrate how the sun strikes the Earth at different angles depending on location.
Demonstrate **the relationship between climate and weather**	Identify the factors that create weather. Show how landscape features are affected by changes in climate or weather. Identify the greenhouse effect. How does industry contribute to it? Describe the relationship between altitude and weather. Understand that changes in the weather may be seen as fronts that are put in motion by the jet stream. Identify types of precipitation. Differentiate between types of clouds. Understand the effect of winds, wind speeds, and impacts on vegetation.
Learn **and** *apply* **concepts relating to the oceans**	Label the major oceans and seas. Determine the elements in ocean water (nearly all elements are present). Identify or draw the structural components of the ocean floor.

	Explain the relationship between the moon and the tides. Explore ways the ocean is used for power and business.
Investigate **principles of water**	Identify the parts of the water cycle and the effects of the processes involved. Define water's chemical properties—water is the universal solvent; water has a neutral ph of 7; chemically, water is one atom of oxygen bound to two atoms of hydrogen. Measure salinity. Which industries rely heavily on water? Define water's physical properties—water is the only natural substance that exists as solid, liquid, and gas; water's surface has a high density; water has a high tolerance for heat (heat index); water's weight; water as a coolant; specific gravity.
Investigate **conservation of physical and natural resources**	As relating to your industry, discuss or debate the issues of • allocation of resources, • recovering resources, and • best/worst methods of using resources. Compare/contrast renewable and nonrenewable resources. Note the important developments in your industry regarding mineral, soil, water, and wildlife conservation. Discuss alternative sources of energy as relating to your industry.
Investigate **issues regarding scientific technology**	As relating to your industry, discuss the uses of technology. What are the newest developments? What effects does the technology have on our society? Political system? Discuss the role of economics on technology.

Apply **science principles/laws to environmental issues**	Discuss how mankind alters the Earth and environment through pollution and the use of resources and technology.

Crosswalk to SkillsUSA

SkillsUSA, the co-curricular student organization for technical and professional education, provides many opportunities through its program of work for students to apply the knowledge, skills, and processes learned in a variety of courses. A correlation of the Job Interview and Job Skill Demonstration technical contests to selected tasks/competencies in Arkansas' Industrial Apprenticeship/Work-Based Learning courses are provided as a supplement to this framework.

JOB INTERVIEW

Purpose
To evaluate contestants' understanding of employment procedures they will face in applying for positions in the occupational areas for which they are training.

First, refer to General Regulations, Page 9.

Clothing Requirement
Men: Official red blazer, windbreaker-style jacket, or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks; and black shoes

Women: Official red blazer, windbreaker-style jacket, or sweater; black dress slacks or skirt; businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone hose; and black shoes

Eligibility
Open to active SkillsUSA members

Observer Rule
No observers will be permitted to view the contest.

Equipment and Materials
- Supplied by the technical committee
  - Employment application forms
  - Timer
  - All necessary information and furnishings for judges and technical committee
- Supplied by the contestant:
  - Three copies of a one-page typewritten personal resumé; no other material may be submitted by the contestant
  - Pen for completing application form

Scope of the Contest

- Contestants should prepare for the job interview contest by developing the following abilities:
  - answer questions and carry on a casual conversation,
  - demonstrate a confident handshake, proper greeting, and personal introduction,
  - prepare a personal resumé and job application,
  - know the aspects of making positive first impression,
  - develop listening skills and show sincere interest,
  - demonstrate good grooming in dress and personal hygiene,
  - demonstrate confidence and positive personal image,
  - pronounce words in a clear and understandable manner,
  - know their personal qualities and how to "sell themselves" to a prospective employer, and
  - effectively vary voice in pitch, tone, tempo, and volume
- The contest will be divided into the following three phases:
  - the receptionist's preliminary evaluation,
  - completion of employment application, and
  - an in-depth interview.
- Contestants shall apply for positions in keeping with their vocational objectives. In completing the personal resumé and employment application, contestants will use their own name, address, school, employment, and occupational information. All information must be as accurate as possible.
- The receptionist will serve as a judge.
- When called from the assembly area, the contestant will approach the receptionist as though applying for a job in the occupational area consistent with the contestant's training program. Contestants will be given an employment application to complete within 30 minutes in the receptionist's presence.
- Contestants will complete the application by printing in ink. The receptionist will note the time the contestant is handed the application and the time the completed application is returned. One point will be deducted for each minute or fraction thereof over the 30-minute time limit (maximum deduction of ten points). Information such as the following may be asked on the application:
  - employment desired;
  - education;
  - membership in civic, community, or school organizations;
  - former employers and work experience; and
  - references.
- The receptionist will receive the completed application along with three copies of a one-page, typewritten resumé prepared in advance and supplied by the contestants. The following information must be contained in the one-page resumé:
  - name, address, and phone number;
  - career objective;
  - education and training;

  - work experience beginning with present employment listing specific responsibilities;
  - memberships, major accomplishments, awards earned; and
  - references upon request.
- After the receptionist evaluates the application, a technical committee member will present three copies of the personal resumé to the interviewing committee (judges).
- After the judges review the personal resumé, a technical committee member will direct the contestant to the judges for the interview.
- The interview with the judges will be approximately ten minutes. This will allow adequate time for four to six questions.
- All contestants will be asked identical questions. Such questions might include the following but will be determined by the judges:
  - What are your occupational objectives?
  - What do you like most about this occupation
  - What are your hobbies?
  - What would you like to be doing five years from now? Ten years?
  - Why do you want to work for our company?
  - What two accomplishments have given you the most satisfaction?
  - What are your extracurricular activities?
  - How would you describe your ideal job?
  - What do you think determines a person's progress within a company?
  - What do you consider to be your outstanding job-related personal characteristics or strengths?
  - What qualifications and characteristics do you have that make you feel you'll succeed in your work?
- Judges are encouraged to use their own interview techniques and should keep the focus of the interview on the selected questions.

Arrangement of Rooms

- Holding room—An area will be set up in which contestants will assemble to wait their turns.
- Receptionist's area—An area will be furnished with receptionist's desk and necessary tables and chairs at which contestants will complete their employment applications.
- Interview room—A room will be furnished with table and chairs for the contestant and interviewing committee of three judges.

Items Evaluated by Receptionist

- Greeting and introduction
- Appearance/posture/grooming
- Completeness and legibility of application form

Items Evaluated by Interviewer

- Greeting and introduction
- Appearance/posture/grooming

- Completeness and clarity of resumé
- Maturity
  - Answers to questions
- Presentation
  - Self-confidence and persuasiveness
- Preparation: knowledge of position applied for and personal history
- Personal salesmanship
- Application time penalty—minus zero to ten pts.
- Clothing penalty—minus zero to five percent of total points

JOB SKILL DEMONSTRATION

Purpose
To evaluate each contestant's ability to demonstrate and explain an entry-level skill used in the occupational area for which he or she is training

First, refer to General Regulations, Page 9.

Clothing Requirement
Men: Official red blazer, windbreaker-style jacket, or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks; and black shoes

Women: Official red blazer, windbreaker-style jacket, or sweater; black dress slacks or skirt; businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone hose; and black shoes

Eligibility
This competition is open to active SkillsUSA members enrolled in career and technical programs with career objectives that are included in the annual SkillsUSA Championships (Job Skill Demonstration A) or career objectives that are NOT included in the annual SkillsUSA Championships (Job Skill Demonstration B). The classification (A or B) is based on the vocational enrollment and career objective of the contestant. It is not based on the specific skills to be demonstrated. See the current SkillsUSA Championships Technical Standards for a list of current SkillsUSA Championships that may be demonstrated in Job Skill Demonstration A.

Equipment and Materials
- Supplied by the technical committee
  - Timekeeper
  - All necessary information and furnishings for judges and technical committee
- Supplied by the contestant
  - All materials and equipment needed for the demonstration to be completed two times—once for the preliminaries and again for the finals, if required

Scope of the Contest

- Contestants should prepare for the job skill demonstration by developing the following abilities:
  - prepare a five- to seven-minute demonstration;
  - practice elements of informal conversation;
  - demonstrate an effective and pleasing delivery style;
  - pronounce words in a clear and understandable manner;
  - demonstrate good platform deportment and personal confidence;
  - organize demonstration in a logical and coherent manner;
  - effectively vary voice in pitch, tone, tempo, and volume;
  - demonstrate good grooming in dress and personal hygiene
- The demonstration is a performance of an occupational skill accompanied by a clear explanation of the topic through the use of experiments, displays, or practical operations. An actual skill must be performed as opposed to an illustrated talk. Note cards and other reference materials are not permitted.
- Any skill may be demonstrated, provided it is a skill related to the occupational program of the contestant.
- The demonstration shall be at least five minutes in length but shall not exceed seven minutes. Penalty: Five points will be deducted for each 30 seconds or fraction thereof under five minutes or for each 30 seconds or fraction thereof over seven minutes.
- Time limit: Time will be started when the demonstration begins. The timekeeper will signal the speaker at five minutes, six minutes, and six minutes 30 seconds.
- Contestants will be allowed three minutes to set up the demonstration and three minutes to clear the demonstration room. Penalty: Five points will be deducted for each 30 seconds or fraction thereof over the three-minute allowance.
- A performance space of 8' x 12' will be provided that contains a 30" x 96" table and one duplex (two plug-ins) 110-volt (15 amp) electrical outlet.
- Any visual or auditory aids (signs, charts, transparencies, slides, diagrams, tapes, CDs) are to be prepared by contestants. Professionally prepared visuals and audio materials may not be used. No pressurized aerosol cans of any kind will be permitted, and no compressed air, gas, or flammable liquid may be used.
- The contestant will not mention his or her name, school, city, or state.
- The demonstration is an individual performance; however, assistants may be used to set up and dismantle the demonstration. Models or assistants may be used in the demonstration but will not say or do anything that assists the demonstration other than serve as a model as needed for a facial, clothing design demonstration, etc.
- Basic safety practices related to the skill performed must be followed. Safety violations will be subject to penalties of one to ten points. Judges may stop the demonstration for serious violations.

Items Evaluated

- Opening
  - Clearly identifies scope of demonstration

- Voice
  - Pitch, tempo, volume, diction, enthusiasm
- Platform deportment
  - Gestures, poise, use of visual aids, mannerisms
- Organization
  - Logic, clarity, suitability, coherence
- Skill
  - Skill level, technique, appropriateness
- Effectiveness
  - Covers topic, informative, interesting
- Closing
  - Summary, conclusion
- Time penalty
  - minus five points for each fraction of 30 seconds under five minutes or for each fraction of 30 seconds over seven minutes)
  - Clothing penalty—minus zero to five percent of total points
  - Safety penalty—minus zero to ten points

Arkansas' All Aspects of Industry

Defining "All Aspects"

All aspects of an industry include, with respect to a particular industry that a student is preparing to enter, planning, management, finance, technical and production skills, underlying principles of technology, labor and community issues, health and safety, and environmental issues related to that industry. Planning is examined at the level of both an individual business and the overall industry. Planning elements might include

- developing strategic plans — mission, vision, goals, objectives, and/or a plan of action;
- working with planning tools such as surveys, market research, and competitive analysis;
- anticipating needs for staffing and major purchases of equipment and supplies;
- developing plans for training and upgrading of staff;
- forecasting market trends; and
- developing business plans for entrepreneurial ventures.

Management addresses methods typically used to manage enterprises over time within the industry, as well as methods for expanding and diversifying workers' tasks and broadening worker involvement in decisions. Key elements of management might include

- using an organization chart to explain how a corporate chain of command works;
- providing input for strategic plans and communicating the company's vision and mission statements;
- leading employees in carrying out strategic plans and action plans;
- evaluating employee performance;
- anticipating technology and other major purchasing needs;
- ensuring equity and access for employees;
- resolving conflicts;
- developing job descriptions and written policies/procedures;

- identifying recruitment procedures, training opportunities, methods of evaluation, and retention strategies; and
- working with professional associations and community outreach efforts.

Finance examines ongoing accounting and financial decisions and different methods for raising capital to start or expand enterprises. Finance functions might include

- developing budgets;
- preparing financial statements;
- analyzing and managing financial transactions and records;
- implementing payroll procedures;
- determining and paying taxes;
- identifying indirect wage costs (benefits, FICA, insurance, worker's compensation);
- making loans and granting credit to customers;
- developing graphs and charts related to company finances;
- identifying and implementing methods of sustaining profitability of a business;
- managing 401K plans; and
- identifying sources of capital.

Technical and production skills cover specific production techniques and alternative methods for organizing production work, including methods that diversify and rotate workers' jobs. Technical and production skills that an employee should have to succeed in a business or industry might include

- developing and upgrading job-specific skills;
- using troubleshooting and problem-solving techniques;
- analyzing information to make decisions;
- identifying and implementing quality assurance techniques;
- employing communication skills such as writing, listening, speaking, and reading;
- participating in team efforts;
- implementing projects and new techniques;

- demonstrating basic computer skills; employing time management techniques in completing projects and assigned tasks; and
- demonstrating ethical behavior and work ethic.

Principles of technology provide an integrated study across the curriculum of the mathematical, scientific, social, and economic principles that underlie the industry's technology. Principles of technology that an employee should know might be demonstrated by

- exhibiting proficiency in mathematical and scientific functions related to new and emerging technologies,
- continuously upgrading job skills needed to implement new technologies,
- participating in industry certification programs,
- cross-training to enhance one's value to the organization and to enhance job promotion opportunities, and
- understanding and adhering to ethical issues related to technologies.

Labor issues examine worker rights and responsibilities, labor unions, labor history, and methods for expanding workers' roles. Labor issues might include

- understanding and implementing worker rights and responsibilities;
- working with labor unions;
- keeping abreast of local, state, and federal legislation affecting employee and employer rights and responsibilities;
- negotiating and settling worker disputes;
- identifying certification requirements for specific jobs; and
- analyzing the impact of labor agreements on business operations.

Community issues explore the impact of the industry on the community and the community's impact on and involvement with the industry. Concepts of business and community relations might include

- developing and working with community outreach projects,
- participating on advisory committees and community organizations,

- working with professional associations,
- developing and implementing public relations plans, and
- participating in community service projects.

Health, safety, and environmental issues examine these concepts in relation to both the workers and the larger community. Concepts related to health, safety, and the environment might include

- identifying and implementing federal, state, and local regulations related to the health and safety of employees;
- understanding and strictly adhering to federal, state, and local environmental regulations related to the business;
- identifying job-specific health hazards and safety issues;
- identifying and implementing basic safety and first aid training techniques for emergencies, such as personal illness or injury, tornadoes, fires, nuclear accidents, floods, and incidences of employee-rage or violent behavior;
- communicating safety regulations and plans to employees; and
- working with selected community groups to implement safety programs.

Industrial Apprenticeship/Work-Based Learning Framework Cross Reference

Industrial Apprenticeship/Work-Based Learning I

Unit 1 Introduction to ICT I	Duty(s): A
Unit 2 Rules and Regulations for ICT	Duty(s): A
Unit 3 Leadership Achievement	Duty(s): A
Unit 4 Employee Regulations	Duty(s): A
Unit 5 Job Applications	Duty(s): B
Unit 6 Job Interview	Duty(s): B
Unit 7 Understanding the Paycheck	Duty(s): B
Unit 8 Money Management	Duty(s): B
Unit 9 Cost of Accidents and Personal Safety	Duty(s): C
Unit 10 Elements of Industry	Duty(s): D
Unit 11 Industry and the Economic System	Duty(s): D
Unit 12 Research and Development	Duty(s): E
Unit 13 Product Design	Duty(s): E
Unit 14 Quality Control and Production	Duty(s): E
Unit 15 Distribution of Products	Duty(s): E
Unit 16 Taxes	Duty(s): F
Unit 17 Work Ethic	Duty(s): G
Unit 18 Positive Motivation	Duty(s): G
Unit 19 Continuing Education	Duty(s): G
Unit 20 Preparing for Distribution	Duty(s): H
Unit 21 Establishing a Company	Duty(s): I
Unit 22 Management	Duty(s): I
Unit 23 Labor	Duty(s): I
Unit 24 Future Trends	Duty(s): J
Unit 25 Types of Ownership	Duty(s): J
Unit 26 The SkillsUSA Student Organization	Duty(s):

Industrial Apprenticeship/Work-Based Learning II

Unit 1 Employment Safety	Duty(s): K
Unit 2 Tools, Equipment, and Material	Duty(s): K
Unit 3 Supply and Demand	Duty(s): L
Unit 4 Foreign Competition	Duty(s): L
Unit 5 Human Resources	Duty(s): L
Unit 6 Natural Resources	Duty(s): L
Unit 7 Capital Resources	Duty(s): L
Unit 8 Productivity	Duty(s): M
Unit 9 Profit Margin	Duty(s): M
Unit 10 Obtaining Capital	Duty(s): M
Unit 11 Research and Development	Duty(s): M
Unit 12 Identifying Consumer Demand	Duty(s): M

Unit 13 Government Controls and Regulations	Duty(s): M
Unit 14 Types of Industries	Duty(s): N
Unit 15 Location	Duty(s): N
Unit 16 Opportunities	Duty(s): N
Unit 17 Robotics	Duty(s): O
Unit 18 Automation	Duty(s): O
Unit 19 Disappearing and Emerging Jobs	Duty(s): O
Unit 20 High Technology Training	Duty(s): O
Unit 21 Types and Media	Duty(s): P
Unit 22 Cost vs. Outcome	Duty(s): P
Unit 23 Marketing Research	Duty(s): Q
Unit 24 Transportation	Duty(s): Q
Unit 25 Consumer Satisfaction	Duty(s): Q
Unit 26 Packaging Strategies	Duty(s): Q
Unit 27 Industrial Sales and Service	Duty(s): Q
Unit 28 Competition for Consumers	Duty(s): R
Unit 29 Competition Among Nations	Duty(s): R
Unit 30 Management	Duty(s): S
Unit 31 Mid-management	Duty(s): S
Unit 32 First-Line Management	Duty(s): S
Unit 33 Labor	Duty(s): S
Unit 34 Industrial Decision Making	Duty(s): S
Unit 35 Intracompany Mobility	Duty(s): S
Unit 36 Employer-Employer Relationships	Duty(s): S
Unit 37 Personal Occupational Decisions	Duty(s): T
Unit 38 Future Goals	Duty(s): T
Unit 39 The SKillsUSA Organization	Duty(s):